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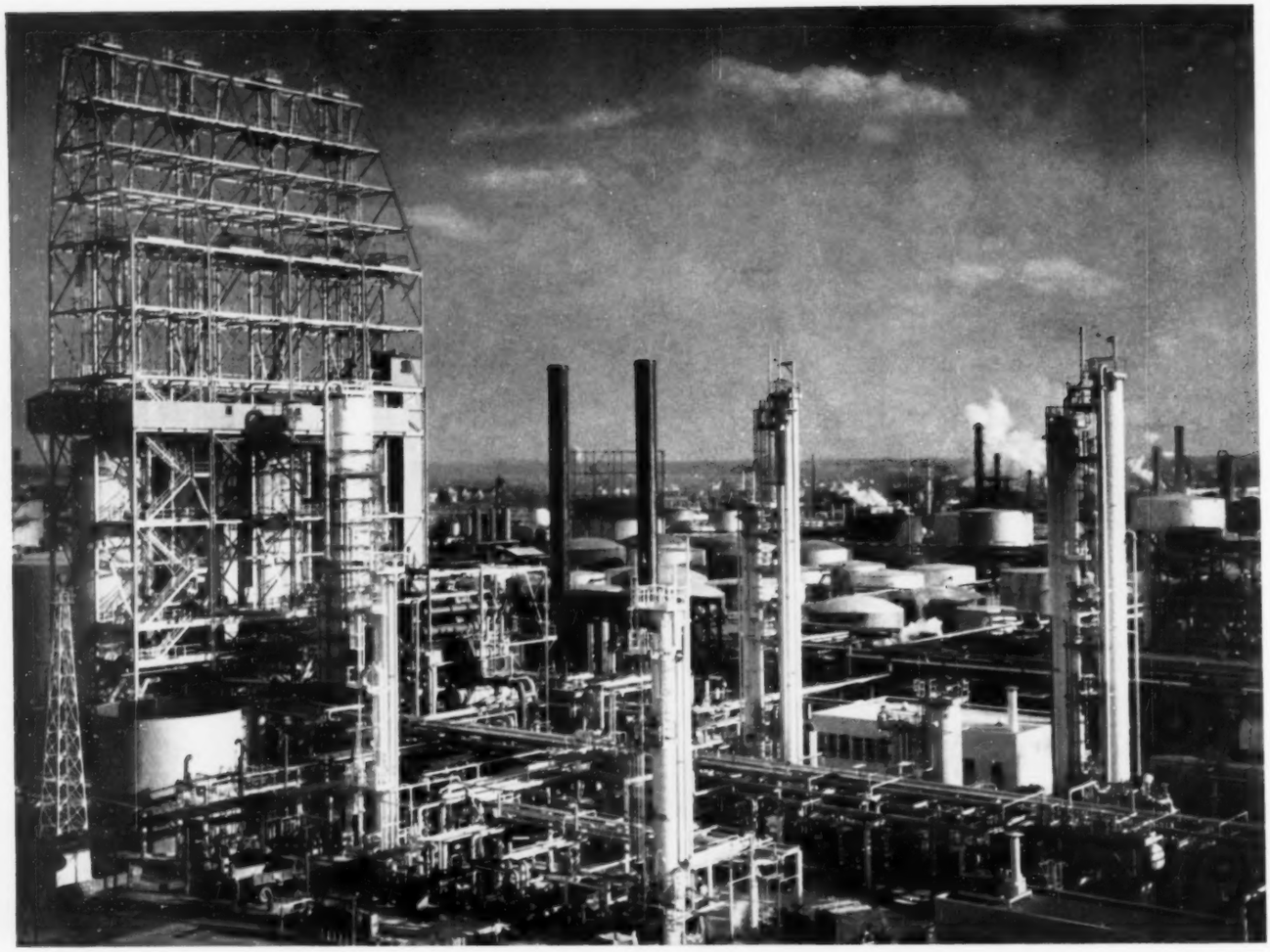

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THIS MONTH'S COVER

A new producer in the Swan Hills area of northern Alberta, Shell South Swan Hills, is shown on a bright winter day. The well is producing from the Beaverhill Lake reef at an initial restricted flow potential of 1,022 bbls/day. This photograph is furnished through the courtesy of Shell Oil Co. of Canada, Ltd.

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POSITION B

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By Joseph B. Huttlinger

Will The Import Program Last?

The new oil-imports program is virtually certain to remain in effect for at least the next year, but attacks are building up from oil-importing companies, foreign oil-producing nations, and congressmen from oil-consuming states. Observers say there is no chance the hearings will result in passage of the bill of Senator Joseph C. O'Mahoney (D., Wyo.), chairman of the Senate Public Lands Subcommittee, to set up the rules for a permanent, mandatory program on oil imports. They see even less chance for passage of the bill of Senator William Proxmire (D., Wis.), to rescind the oil-imports program.

So, any change in the program would be up to the US courts. At least half a dozen oil-importing companies have said they plan court challenges on the grounds the program is a denial of due proess of law, arbitary and capricious, and based on a law which is too broad and vague to authorize this kind of action. Certain delays, however, are apparent in the court route. First, the new program provides for an appeals board to receive complaints from oil importers that their quotas are too low, but Secretary of the Interior Fred A. Seaton took his time about setting up the appeals board. Any company wanting to go to court felt that it must exhaust all relief under the import program first. Once the appeals board was in existence, it could take weeks or months to hand down its decisions. Only after this would the way be clear to go to court.

Thus, it appears it will be late spring or early summer before oil importers are ready to seek relief in the courts. Chances of speedy relief are slim from the US Court of Appeals, partly because the courts take a long summer holiday. So, it might be autumn before arguments are held. And the court could take more weeks or months to hand down its opinion.

Finally, an appeals-court verdict, whichever way it goes, is certain to be appealed to the US Supreme Court. Pending the appeal, the import program would continue. A petition to the high tribunal, filed late this year, conceivably could be heard by the high court early in 1960. While it is difficult to predict a time table, usually the high court takes several months after arguments to hand down its opinions. Thus, the final word could hardly come before a year from now at the earliest, and it could be put off well beyond that.

In the meantime, the oil-import program, as proclaimed by President Eisenhower, March 10, would continue in force, subject only to changes made by the administrative branch of the government on its own. While these changes could mean substantial modifications in the quotas allowed in—perhaps in the event oil prices rose substantially—even administrative changes would require time.

The one hint that the President may change the program

Pipeline

lies in a clause calling upon the OCDM director to maintain a close watch on oil prices and, if they rise, to report to him whether the rises are needed in the interests of national security. US officials have explained that the course of action which would be followed if the price rises were found unjustified would be to raise the allowed quotas of oil imports.

Price Controls From Import Contrl

US oil producers have a mandatory program to limit imports of crude oil and of oil products, but they are paying a price for it. The price lies in the words of the Presidential proclamation calling upon the director of the Office of Civil and Defense Mobilization to maintain close "surveillance" over prices of crude oil and products.

This marks the furthest advance of the government in the direction of price control over any competitive industry in times of peace. If prices rise, the OCDM director is directed to determine whether the rises are needed for national security. The indication is that, if the rise is not needed, the President will allow in more oil imports to hold down prices. This adds an uncertainty to the program, and raises questions as to whether importers opposing the program can bring it to an end by hiking prices.

More important, the price clause is a foot in the door for price controls over the entire oil industry. Consumers now have a place to lodge complaints about prices. And congressional committees, when and if they investigate oil prices, have a place in government to seek an official opinion as to the justness of prices. The USA has no power to impose price controls on such.

Secretary of the Interior Fred A. Seaton said the aim of the program is a "reasonably stable market" for oil, not higher prices, which was an aim of a similar quota program for lead and zinc.

President Eisenhower told a news conference that the price section means just what it says. The OCDM, he said, is to determine whether "the security of the nation did demand any increased prices." Maybe the security does demand higher prices, he implied. On the other hand, "if you would run the prices too high, you could be very definitely weakening the national security of our country, because you could hurt our economy to the point that it would be indeed difficult to keep on the level we want."

Complaints about the program are mounting as oil companies study it. Here are a few of them:

Some importers claim it is unfair to give small refiners 12% of their input in imports of crude and unfinished oils, while holding larger refiners to only 4%. In the case of imports to the West Coast, the percentages are 25% for the small, and 6% for plants over 200,000 b/d.

Others claim there is no justice in handing out import quotas on the basis of refinery inputs for crude and unfinished oils and on the basis of a history of imports for finished products and residual oil. Sinclair Refining Co., for example, which imported products in 1958, but not in 1957, now is barred from product imports.

Complaints are heard that inland refiners, who cannot eco-

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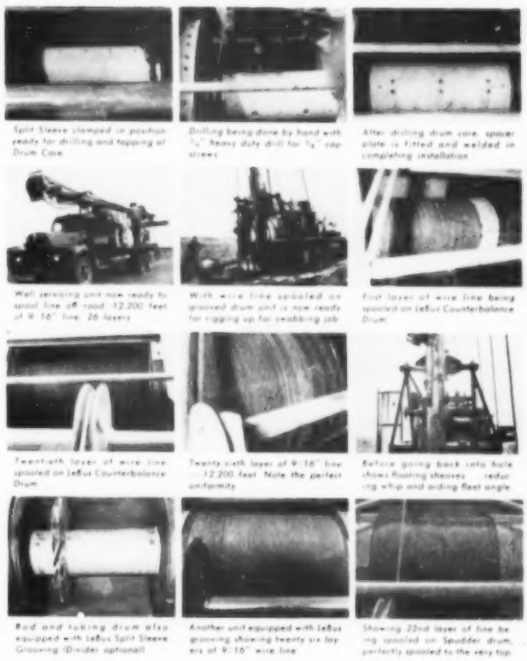

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nomically use the imported crude, should receive no quotas. Others urge that a company with a quota be forced to either use the quota in its own plant or not import it at all. Under the program, imported oil may be exchanged for domestic crude or unfinished oil, but no cash is to change hands in the deal. The exchange need not be on a barrel-for-barrel basis, however.

Complaints are that the program cannot be enforced. While it is clear that an importer without a license will not be able to unload at the port of entry, there is less assurance that US officials will be able to check applications for import quotas and see that a company actually had the refinery input claimed. Cuts for some established importers were very steep and are causing screams, despite the alleged floor of 80% under the voluntary program quota.

The way Interior Department officials interpret this floor, Hess Inc., of New Jersey, is cut in its allowed imports to 22% of the levels it had been bringing in under the voluntary program. Crown Central, Eastern States, and Tidewater all suffer cuts to less than half their voluntary program quotas, and Gulf and Texaco are cut well below 80%.

Others complain that the thinking of Interior officials is that, by the July-December quota period, all importers should be on a straight refinery input basis in their crude and unfinished oils import quotas. Older importers are urging that the 80% floor on cuts below the voluntary program quotas be retained for this period, as well.

Trillion Barrels USA Reserves

Marling J. Ankeny, director of the US Bureau of Mines, estimates that the USA and its continental shelves, "originally contained about 1,000 billion barrels" of crude oil. Of this, he said, about 300 billion barrels, can be recovered on the basis of present practices which recover 30% of oil found.

Of the 300 billion barrels, he said 60 billion barrels have been produced and used, and 30 billion are in proved reserves of recoverable oil. Another 210 of recoverable oil are yet to be found, he added. The figures are new ones supplied to the House Appropriations Subcommittee under questioning in a prepared statement.

Depletion Attack Stalled

The leaders of the House Ways and Means Committee are giving a cold shoulder to the Treasury Department proposal for a law to set a "cutoff" point for purposes of the oil and gas depletion allowance. "It would throw open the whole subject of depletion to debate in the committee and on the floor of the House," said one member of the tax-writing committee. "The measure will not come up for attention this year."

Secretary of the Treasury Robert B. Anderson, a friend of the income-tax depletion allowance at the rate of 27.5%, asked the Congress for the "cutoff" bill after a US District Court at Austin, Texas, handed down a decision. The court said the income-tax depletion allowance applies to income not only from crude oil and crude gas, but to products from crude gas. La Gloria Oil & Gas Co. was involved in the case. Leaders of the committee and in the oil industry are in sympathy with the Treasury proposal, but they hope the Treasury's appeal to the US Court of Appeals will overturn the district court. "If so, it might be unnecessary for the Congress to act," a committee member explained.

Frustrated in this, foes of the depletion are trying another method of bringing a vote on the depletion rate as such. Representative Charles Vanik (D., Ill.) and a bloc of liberals are planning to file a discharge petition seeking to bring from the Ways and Means Committee for a vote on the floor a measure by Representative Torbert Macdonald (D., Mass.) to slash the depletion rate to 15% from 27.5%.

They do not expect to succeed in winning signatures of half the House members, which is needed for discharge, but they feel the maneuver will draw attention to the depletion allowance, and raise the sentiment for a change in it. END

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GOODYEAR

LONDON LETTER

By Cecil W. Wood

Soviets Barter Fuel Oil

An agreement has been reached between Russia and Associated Portland Cement Manufacturers Ltd. for the delivery of what is stated to be a "considerable amount" of fuel oil, with payment partly in colored cement. The first delivery was of about 11,000 tons in a Russian tanker, and the company expects at least four or five more this year under the agreement, which is likely to continue for a "fairish time." The fuel is said by the company to have a "distinct price attraction" compared with other sources and its low sulfur content to be another advantage, especially as it is being used in an experimental cement manufacturing process at the plant at Northfleet, Kent, which requires an ash-free fuel. If this is successful, the company may convert other plants to oil firing. The amount of fuel oil imported into the UK in 1958 is not known, but in 1957 the total was only 15,293,000 gal and the cif value £593,560.

BP's Equipment Orders

BP Trading Ltd. last year placed orders for material, equipment and services to the value of £14.5 mm, of which £13.6 mm were placed in the UK. Approximately 47% of the latter were for export. In addition, refineries and other main subsidiaries of BP placed orders worth £3.5 mm in the UK, spread over some 420 suppliers. The value of these purchases to shipping is emphasized by the fact that freight cost was nearly £1.1 mm.

Grangemouth Refinery Expansion

A new 1.8 mm-ton-per-year distillation unit now operating at BP's Grangemouth refinery marks the end of the first stage in a £6 mm program to raise annual refining capacity to 3.2 mm tons per year from 2.2 mm. Other units being commissioned include a de-ethanizer for improving propane-gas quality, a copper-chloride unit for sweetening motor spirit, and gas-oil and kerosine treating units; while 37 new storage tanks are being erected. In the power house, a new boiler for raising 150,000 lb of steam an hour has been commissioned and a 2,250-kw electrical generator, driven by an experimental gas turbine, is being installed.

Large New Scottish Depot

Plans have been announced by Scottish Oils and Shell-Mex Ltd. for a new £325,000 oil depot and tanker jetty to be built at Stannergate on Dundee harbor, Scotland. This will replace an old existing depot, and work will start in June. Storage capacity will be erected for nearly three million gallons of all grades of products, and this will be fed by coastal tankers, up to 800 tons, from Grangemouth refinery. The jetty will have a 120-ft frontage, and will extend 50 ft into the harbor.

Tanker Facilities at Bristol

Bristol City Council has approved a scheme to cost over £1.6 mm to improve the oil basin at the Avonmouth Royal Edward dock. The council had been reminded by the docks committee that, even in 1955, it had been informed that, due to serious wall erosion, construction work was needed urgently to prevent further damage. Since that year, the major oil companies' storage facilities had been considerably expanded, and further demand for development is expected. In addition, to meet the requirements of the larger tankers now in use it has become necessary to provide and extract deep-water berth, to revise the oil pipeline system completely, and to afford further protection for the banks of the oil basin.

Petrochemical Plant for Russia

Vickers Armstrongs (Engineers) Ltd. has secured an order worth about £2¼ mm from Russia for a "chemical industrial plant" subject to contract items being agreed. This was gained in the face of keen competition from many continental firms, including Krupps. The supply of plant will be undertaken in association with another British firm, Highpolymer & Petro-Chemical Engineering Ltd., designers and consultants.

This company was formed as H. J. Zimmer Ltd. in August 1956, and the name changed in August 1957. The original capital of £100 in £1 shares was raised to £50,000 (£100 issued), December 1958, at which date H. J. Zimmer, German manufacturer, ceased to be a director, though still holding 70 of the 100 issued shares. He was replaced by K. H. Schmidt, accountant. The other directors at that date were H. Jacobi (general manufacturer) with 10 shares, J. U. K. Kimbell (British naturalized) director of Kimbell Machine Tools and other companies, with 19 shares, and J. F. Warren, previously secretary.

Snow on Russian Exports

In recent weeks there have been no less than three record gatherings of oil men in London: the Institute of Petroleum annual dinner where 1,450 were present; at Sir Vivian Fuch's luncheon address to the Oil Industries Club, where 494 were present; and at the meeting of the Institute of Petroleum, where there was a record attendance of about 160 to hear H. E. Snow, CBE, deputy chairman of British Petroleum, give his views on "Looking Ahead on the Threshold of Our Second Century." He had this to say on the Russia oil question:

"Until relatively recently, supplies to and from the communist areas have not been a major factor in international trade. The recent increase in the export of oil Russia into the European markets and further afield has given rise to a good deal of speculation as to what the future may hold in this respect. From what has been reported, present exports are related to the need for foreign exchange to pay for imports of machinery and plant for the development of industry. In January last, Mr. Krushchev set out the Soviet goals for oil under the Seven-Year Plan running to 1965. Crude-oil production is planned to double, up to a figure of 240 million tons (4,800,000 b/d) by 1965. Russia is engaged on a very rapid industrial expansion, and has a population approximately the same as that of the United States. Consumption in the US by 1965 is estimated to be of the order of 13,000,000 b/d. Looked at this way, a production in Russia of little more than one-third does not seem overprovision. But how it will work out, and to what extent production increasing to the scale mentioned and supplemented, as in the United States, by rapidly increasing use of natural gas, will be found to provide a margin for export is a matter of speculation, and may involvle other than economic factors."

UK Refining Increases

At almost 33.0 mm long tons, this preliminary figure shows that UK refinery throughput in 1958 reached a new record by a large margin. It compares with 27.8 mm tons in 1957, a year under the influence of the Suez Canal closure, and 28.7 mm in 1956. The total represents an increase of 18.7% over 1954 and 15.0% over 1956.

A noteworthy point is the steadily rising level of throughput as the year progressed. Over the first quarter, refineries were operating at an average rate equivalent to 30.0 mm tons per year, rising to 31.6 mm in the second quarter, 34.1 mm in the third, and to 36.0 mm in the final quarter. In fact, the December throughput of 3,063,200 tons represented an unprecedented yearly rate of 36.8 mm: this is practically the same as the UK capacity total, put at 37 mm tons for the end of 1958 by Petroleum Information Bureau. Refinery output in the past three years can be put in summary form as in the accompanying table—the points of particular interest being the increasing proportion of gas diesel, and fuel oils made and the decreasing proportion of motor and aviation spirit.

Consumption figures for 1958 not yet being available, it is not possible to assess the degree to which demand was met by home refining, but it is clear the time is approaching when further capacity is desirable.

UK REFINERY OUTPUT
(Thousands of Long Tons)

	1958	1957	1956
Motor and aviation spirit	7,750.6 (20.5%)	5,908.2 (21.2%)	6,771.2 (23.6%)
Industrial and white spirit	144.4 (0.4%)	140.6 (0.6%)	136.2 (0.5%)
Kerosine	1,291.7 (3.9%)	839.5 (3.1%)	869.3 (3.0%)
Lubricating oil	751.4 (2.3%)	742.9 (2.6%)	776.4 (2.7%)
Gas diesel oil	6,284.5 (19.1%)	5,066.5 (18.2%)	5,188.8 (18.1%)
Fuel oil	12,572.3 (38.2%)	10,466.6 (37.6%)	10,394.8 (36.2%)
Refinery-fuel consumption*	2,503.6 (7.6%)	2,091.0 (7.5%)	2,130.9 (7.4%)
Bitumen	859.7 (2.6%)	812.8 (2.9%)	933.4 (3.3%)
Other products and loss	1,795.6 (5.4%)	1,750.3 (6.3%)	1,480.3 (5.2%)
Throughput	32,953.8	27,818.4	28,681.3

* Excluding own production.

Oil-Gas Supply Agreement

Under a 10-year agreement taking effect mid-1960, Shell Petroleum Co. will suply the North Western Gas Board at its Ellesmere port works with between 12 and 24 mm therms of Stanlow refinery gas a year. This is equivalent to 70 to 140 tons of treated gas a day. A new gas-treating plant will be built at Stanlow refinery to meet this demand, and the gas will be taken over at the refinery boundary in a new pipeline to be built by the board. It will be processed at the gas works before passing into the grid system for delivery to consumers.

Tanker Program Change

All Peninsular & Oriental Steam Navigation Co.'s tanker due for delivery up to mid-1961 have been fixed at satisfactory rates. This is revealed in the annual report for the year to September 30, 1958, which states that eight tankers were under construction at that date, of which two have since been delivered and are in service. The original group program of 1955 was for 25 tankers of about 500,000 dwt; but is is now stated that, as a result of modifications, the program consists of 16 tankers of larger average size but of the same total tonnage.

Gulf Tanker Financing in Britain

The securing of finance in London for tankers building or to be built continues. This time it is Britama Tankers Ltd., a subsidiary of Gulf Oil (Great Britain) Ltd. The total secured in this case is £15 mm to finance four tankers to be built by Furness Shipbuilding Co., with completion due in 1961. Of this sum, £3½ mm will be provided by four USA banks, and the balance of £11½ mm has been aranged with London institutions, subscribed as the £8½ mm in the form of 6⅜ secured loan stock and £3 mm 6¾% redeemable cumulative preference shares of £1 each, both to be issued at par. This is believed to be the first time redeemable preference capital has been used in London to finance tanker construction, and it is said its existence will enable the company to make better use of investment allowances—and it will have other advantages.

(Continued on page 10)

ATLANTIC CATFORMING is solving refinery puzzles around the world!

Atlantic's Catforming process is being profitably used in these countries that circle the globe. Naturally, there are important reasons that explain this success. Here they are:

1. **CATALYSTS** Designed for your specific problems.
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3. **STABILITY** High activity with long life.
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For further information on how your plant can use Atlantic Catforming techniques, write or wire The Atlantic Refining Company, P.O. Box 8016, Philadelphia 1, Pennsylvania.

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it's the CATALYST that counts

On completion, the vessels will be chartered to Afran Bahams Ltd., a wholly owned Gulf Oil subsidiary.

New Appointments

H. M. CURRIE has been appointed Mobil Oil Co.'s marine branch engineer in London. Joining the company in 1948, Mr. Currie has been marine branch engineer in Newcastle-upon-Tyne since 1951.

H. M. Currie

Dr. Cecil Pepper

Dr. CECIL PEPPER has been appointed managing director of Alexander Duckham & Co. Ltd., lubricating-oil and additive manufacturers. Dr. Pepper joined the company's research laboratories in 1936, became a director in 1941, and since 1952 has held the position of joint managing director.

J. M. SCHIPPES has been appointed a director and elected deputy chairman of Regent Oil Co. Ltd. R. WALTON BALL, managing director, retired March 31, after 28 years' service with the Regent organization, but will remain on the board in an advisory capacity. G. M. MURRAY has resigned as a director.

Dr. J. A. BERRIMAN has been appointed general manager of the Carrington (previously called Partington) works of Petrochemicals Ltd. He succeeds W. E. Huggett, general manger since 1955.

Dr. J. A. Berriman

E. L. Herbert

E. LeQ. HERBERT, managing director of Shell Refining Co., has been elected president of the Royal Institute of Chemistry. This announcement will give pleasure to his many friends in the industry. Mr Herbert is also on the boards of Shell Chemical Co. and Associated Ethyl.

F. H. FRANGENHEIM, who has been appointed managing director of Anglo-Egyptian Oilfields Ltd., has had 27 years' service with the Royal Dutch-Shell group, and was until recently managing director of Shell Portuguesa SARL.

F. H. Frangenheim

A. Lanckton

A. LANCKTON, vice president of Mobil International, has been appointed a director of Mobil Oil Co. Ltd., succeeding J. C. Dean, resigned.

J. G. DAWSON, general manager of the engineering division, has been appointed director of engineering of F. Perkins Ltd.; and GEOFFREY SMITH, director of production. Mr. Dawson was previously chief engineer of Shell's Thornton research center, and joined Perkins in 1955. Mr. Smith, who joined the company in 1957, was for several years previously with the Brush group.

Udex Unit for Stanlow

A Udex unit designed by Universal Oil Products Co. and costing about £800,000 has completed a trouble-free acceptance trial at Shell Petroleum Co.'s Stanlow refinery. It is the first of its kind in any Shell refinery. The product of an important aviation-gasoline blending component from this 1,000-ton-per-day unit will considerably enhance the value of Stanlow output.

Oil-Gas Plant for Singapore

A fourth Onia-Gegi oil-gas unit and aditional ancilliary plant has been ordered by the city council of Singapore from Humphreys & Glasgow Ltd. Last year this firm replaced the coal carbonizing plant at the city gas works entirely by three Onia-Gegi units with a daily capacity of 2 mmcf, but gas demand has risen and a fourth unit is considered necessary.

British Equipment Notes

Taylor Woodrow (Building Exports) Ltd., London, has secured orders from USA contractors engaged in National Iranian Oil Co.'s development program worth nearly £100,000 for Arcon steel-framed fabricated buildings. These will be used as stores, power and pump houses, and administration blocks on the extension of the pipeline to Resht in northern Iran.

The Cape Asbestos Co. is supplying the materials for the insulation contractors, M. A. Boylan Ltd., to the Whitegate (Cork) refinery under construction. Cape's insulant "Rocksil" is also now being used in the tropicalization of caravans and mobile offices being got ready for use by a geological survey team in Libya. These 3-in.-thick slabs, bonded with resin, will keep caravans cool at 120 F without adding too much weight in the event of an air-lift.

An eight-page brochure, "Courlose in Oil-Well Drilling Muds," issued by the plastics division of British Celanese Ltd., describes the properties and methods of use of sodium carboxymethyl cellulose. This water-soluble cellulose derivative is shown to be suitable for thickening, preventing coagulation, stabilizing dispersions, sizing and coating.

Plenty & Son Ltd., of Newbury, Berks, announce that recent export orders include variable-delivery bitumen pumps for refineries at Helsinki and Bordeaux, together with flameproof motors; similar delivery pumps for a German refinery with gear drives and accessories; and two 400-ton-per-hour servo-controlled variable and reversible pumps for heavy and light fuel oil at a Capetown blending and bunkering station, with all ancillary equipment to make the units selfcontained.

Metropolitan-Vickers Electrical Co.'s "Gazette" for January contains interesting information on oil-industry orders completed or placed in 1958 by British refiners, petrochemical manufacturers, and refinery designers. It is illuminating in some cases for the magnitude of the orders. Most of these were for extensions to existing plants, but some were for completely new refineries. For the Whitgate (Cork) plant, for example, the order covers 110 squirrel-cage pump motors from ¾-hp to 500-hp and type AIR switchgear; while a "blanket" agreement covers the supply of all electrical equipment at Esso's Milford Haven plant, and work is already in hand on 184 motors ranging from 50-hp to 125-hp and on 440-volt 3.3-kv and 11-kv distribution switchgear.

New Publications

Conversion Tables of Tanker Rates—A pocket-size new edition of the well-known tables compiled by Conrad Boe Ltd. A/S., ship brokers, which now covers the new Scale No. 3 ATRS USMC rates and vice versa in the main directions of the tanker trade. The Kuwait section, for instance. covers shipments to LeHavre, London, Genoa, Teneriffe, New York, Yokohama, and Melbourne. In addition, there are tables of basic rates, distances, and voyage times for various speeds. Copies are free on request to P. O. Box 1237 Vika, Fr. Nansens Pl. 7, Oslo, Norway.

Standard Methods for Testing Petroleum and its Products—The Institute of Petroleum issues the 1959 (18th) edition of this publication, containing full details of the 136 methods of test, covering every aspect of petroleum testing, which are standardized by this body. (Engine tests are contained in a separate publication entitled *IP Engine Test Methods for Rating Fuels*). Four new testing methods are included in the latest edition. These are: "Analysis by gas chromotography (petroleum gases)"; "Flash point by the Abel apparatus (three methods)"; "Penetration of semi-fluid greases"; and "Roller-bearing performance (lubricating grease)." Ten of the methods previously published have been revised, and additions have been made to the thermometer specifications. Copies from The Institute of Petroleum, 61 New Cavendish Sreet, London, W.I., price 40 s., postfree.

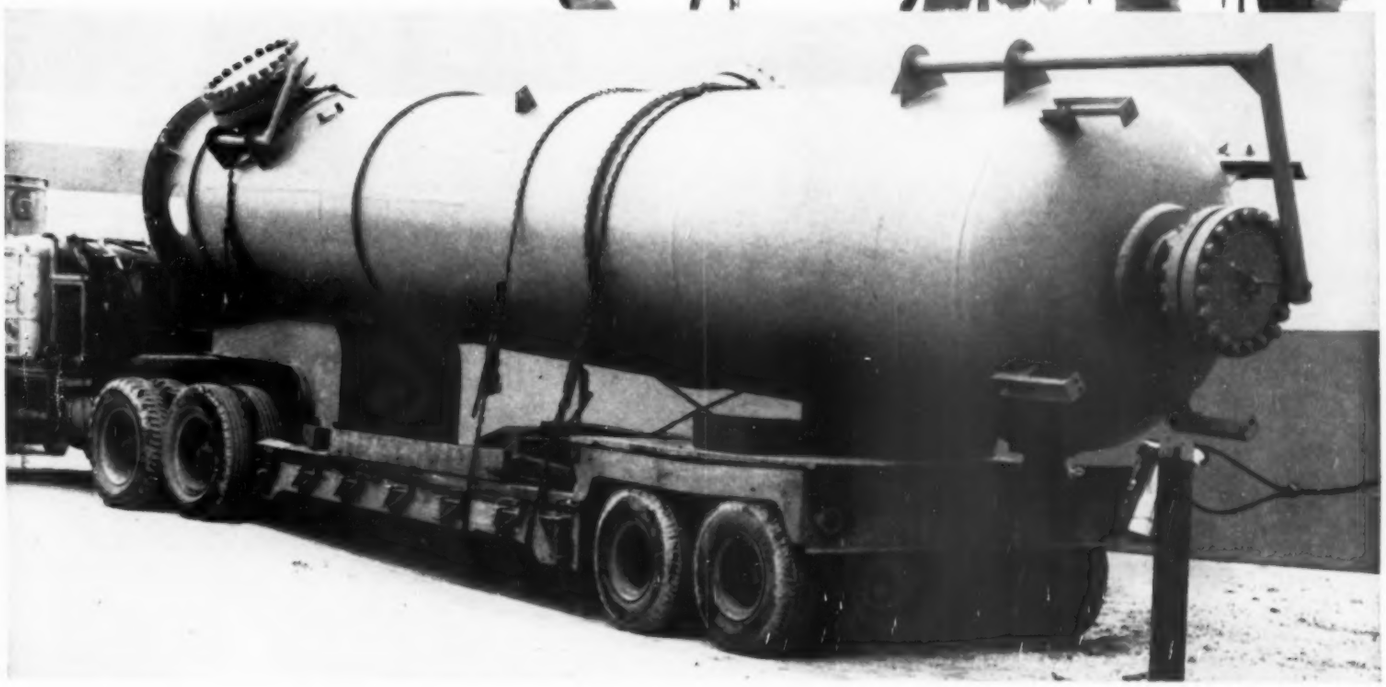
"Port of Bristol Official Handbook 1959"—A profusely illustrated 128-page publication providing up-to-date information on the extensive facilities and services offered by the port of Bristol Authority for all types of merchandise. Including such statistical data on the individual dock sizes, berths, and transit sheds; schedules of dues; tide tables and the like. Copies available from the authority, at Queen St., Bristol.

"Nitrogen"—the first issue appears of a new quarterly with this title which certainly fills a gap in the literature, especially for those who need statistical and economic information on nitrogen brought together in a handy and authoritative way. In fact, it is claimed to be the only publication covering all aspects of this rapidly growing industry. The compilers and publishers are The British Sulphur Corp., and the aim is to cover all developments affecting nitrogen production and consumption throughout the world as an impartial service to producers and consumers alike. This is best illustrated by noting the contents of No. 1. Apart from the 10-page section on "Current Events" and a statistical appendix, there is a 15-page world review; a section on supply, trade, and prices; and several articles of technical interest. Of particular interest are those on the Foster-Wheeler processing sequence in the Texaco-Casale ammonium process, and on the Fauser-Montecatini urea process. The publishers are at 95 Wigmore St., London, W.I, and the annual subscription to *"Nitrogen"* is £10, 10s.

Tanker Economics and Statistics—Three reports are available which discuss tanker economics from various angles, and present statistical data which are valuable for reference purposes. **"World Tanker** *Fleet Review"* of John I. Jacobs & Co. Ltd. (9 St. Helen's Place, London, E.C. 3) is always welcome for the value of both the views expressed and the age analyses of the world fleets is presents. The December 31, 1958, review lives up to a high standard long established. *"Tanker Freight Statistics,"* compiled by Harley, Mullion & Co. Ltd. (43-51 St. Mary Ave., London, E.C. 3), presents tables and charts of hard- and soft-currency freight rates covering a nmber of years for various size vessels. Yet another (but not overlapping) set of views and *"Chamber of Shipping of the United Kingdom Anual Report 1958-1959,"* available also free from 3-6 Bury Court, London, E.C. 3. It is indeed true that the oil economist interested in tankers has ample statistical material to draw on. END.

35 TON DEHYDRATOR by AVONDALE

DESTINATION: A GASOLINE PLANT



The product you see above is a large dehydrator—35 tons of heavy steel plate—40 ft. long, 2⅜ in. thick and fabricated by Avondale. The same facilities that turn out ships for the Navy, now serve the interests of the industrial portion of the oil industry—large capacity machine facilities unmatched in the South. From design and engineering to delivery of the finished product, Avondale is equipped to handle the overall job . . . whether the contract calls for a pressure vessel or any one of hundreds of other industrial steel products.

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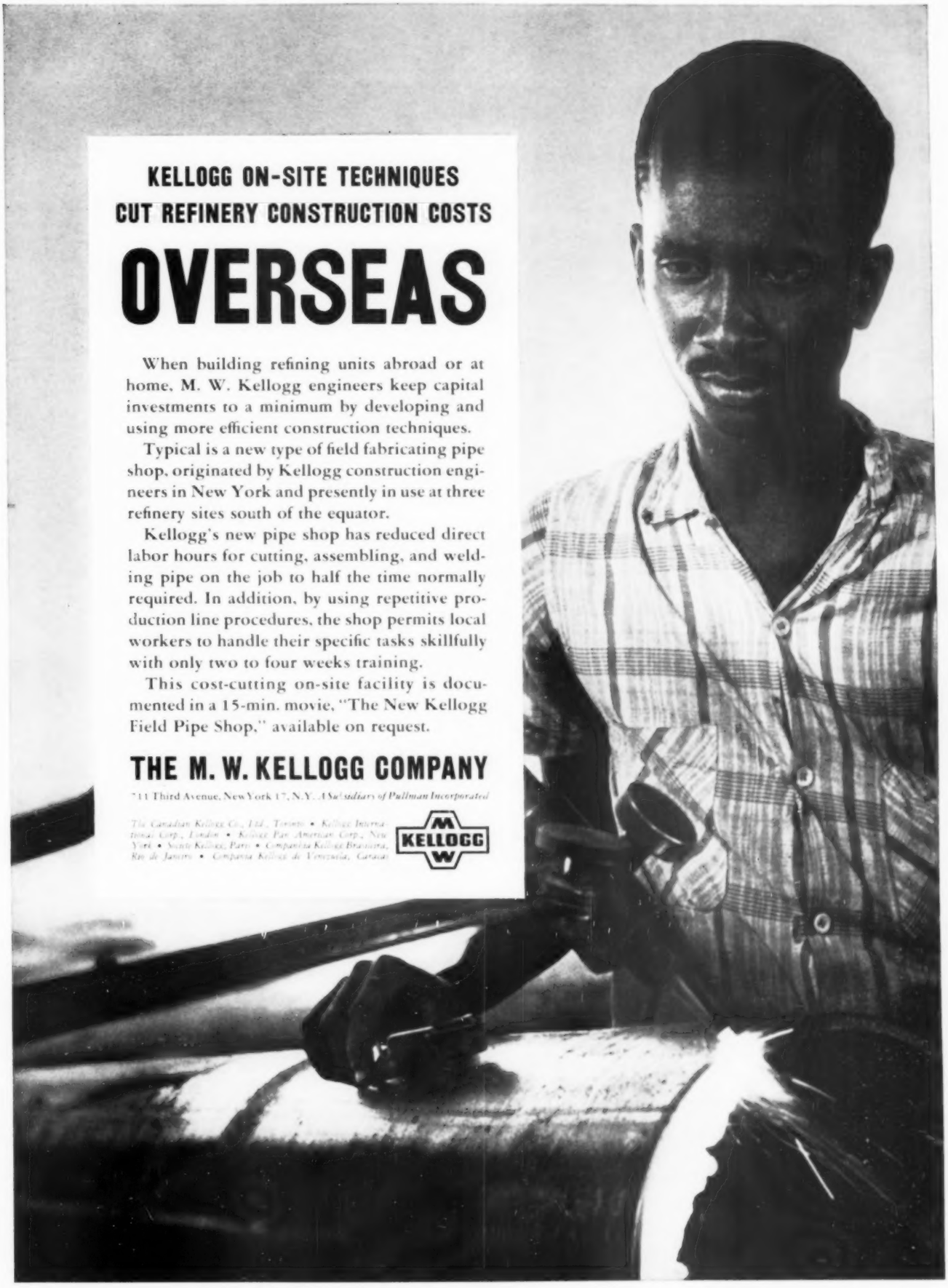

KELLOGG ON-SITE TECHNIQUES CUT REFINERY CONSTRUCTION COSTS

OVERSEAS

When building refining units abroad or at home, M. W. Kellogg engineers keep capital investments to a minimum by developing and using more efficient construction techniques.

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Kellogg's new pipe shop has reduced direct labor hours for cutting, assembling, and welding pipe on the job to half the time normally required. In addition, by using repetitive production line procedures, the shop permits local workers to handle their specific tasks skillfully with only two to four weeks training.

This cost-cutting on-site facility is documented in a 15-min. movie, "The New Kellogg Field Pipe Shop," available on request.

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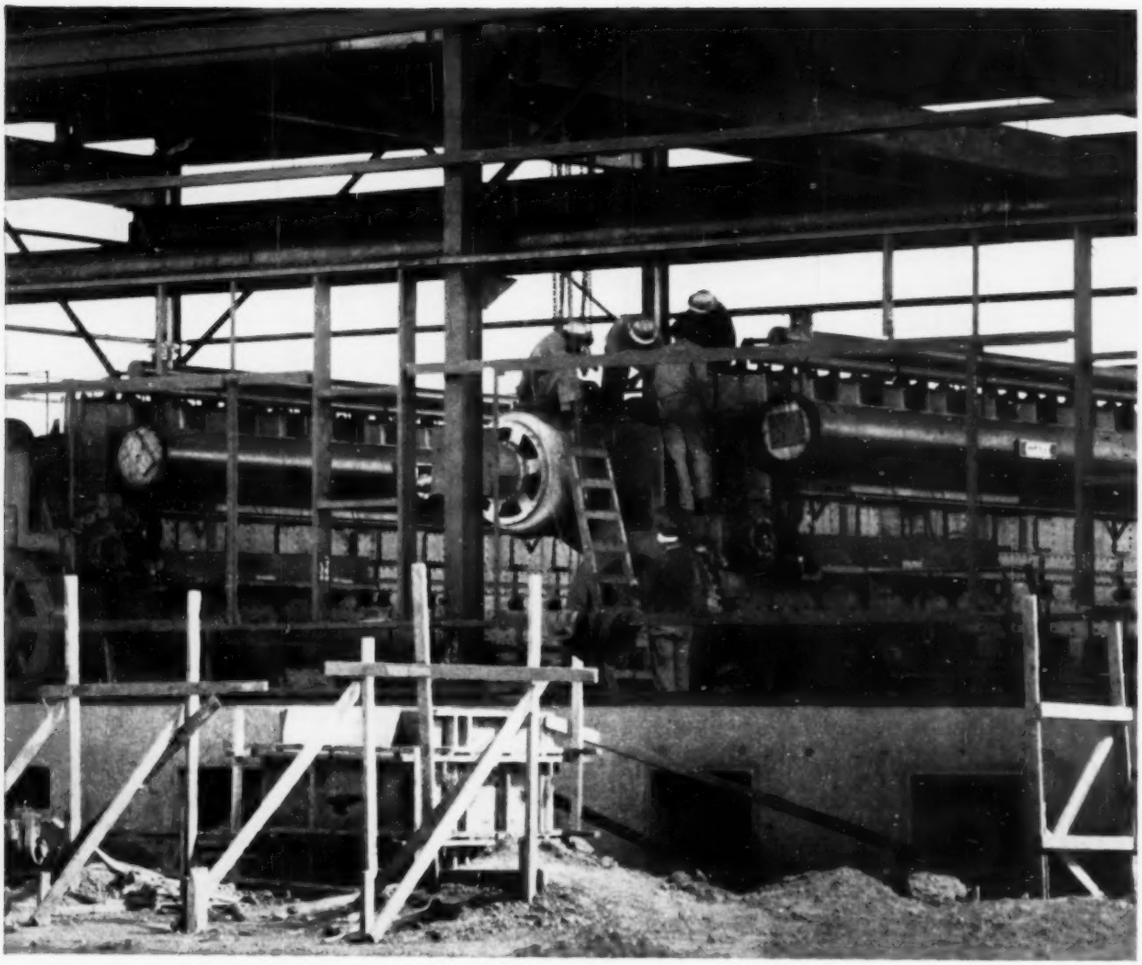
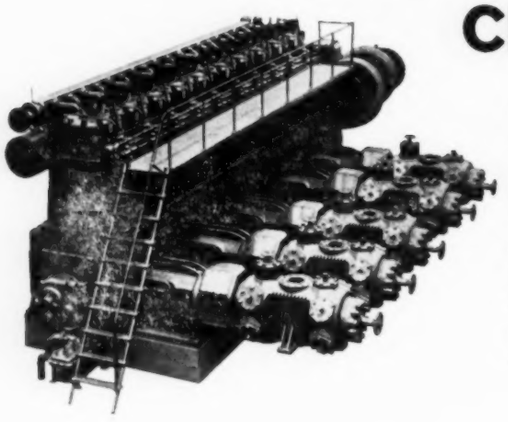


NINE CLARK TLA-10's

Clark turbocharged



Nine Clark 3400 bhp. turbocharged, 2-cycle TLA-10's will soon be handling all of Trans-Canada's compressor requirements for the big 34" western section of one of the world's largest gas pipelines. Here in the prairie provinces, loads will be the heaviest . . . dependability and economy of operation a must. But that's no problem with modern TLA-10's on the job. They are specifically designed for 3400 bhp. loads with no encroachment upon overload carrying ability. If extra power is needed to meet emergencies, it is there for the taking.

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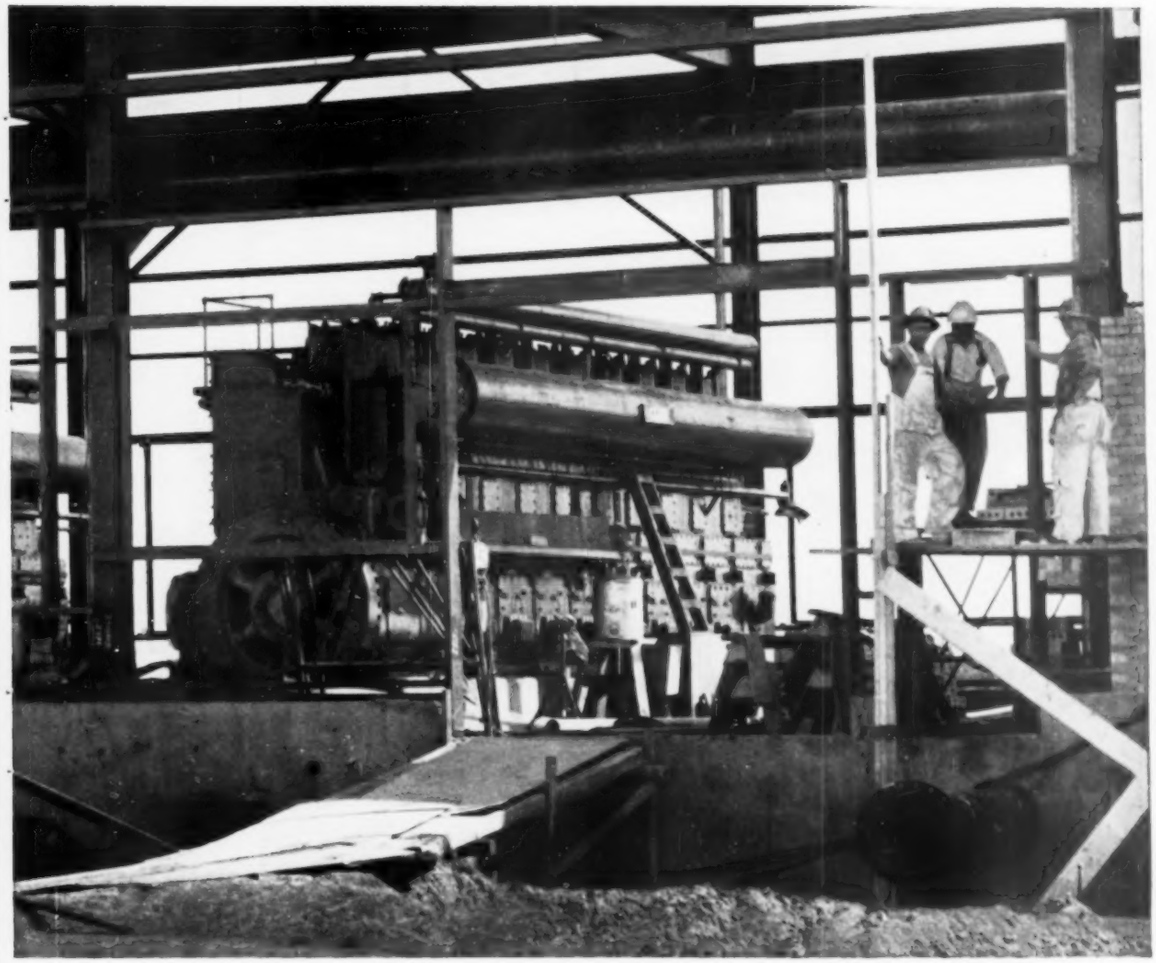

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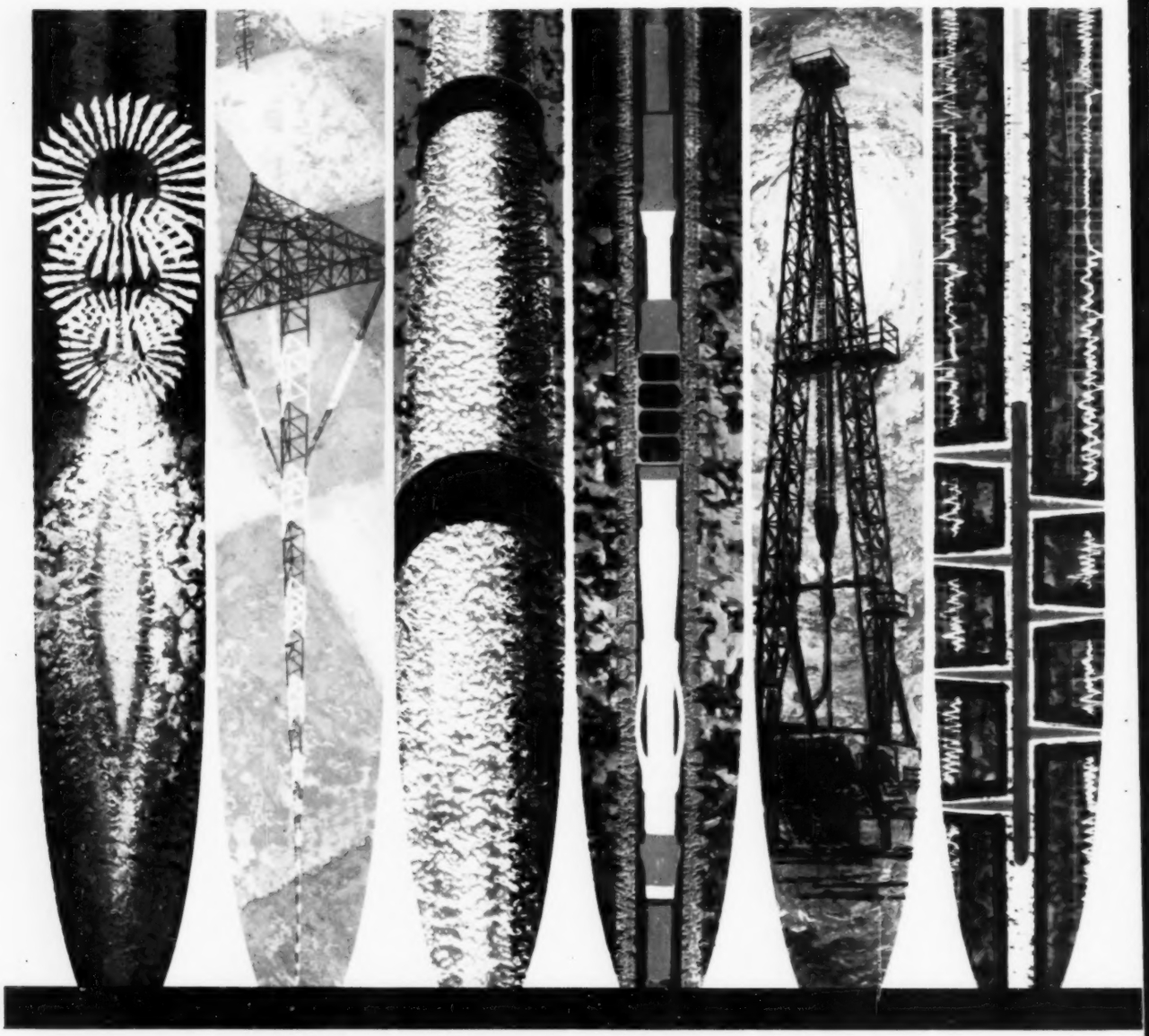

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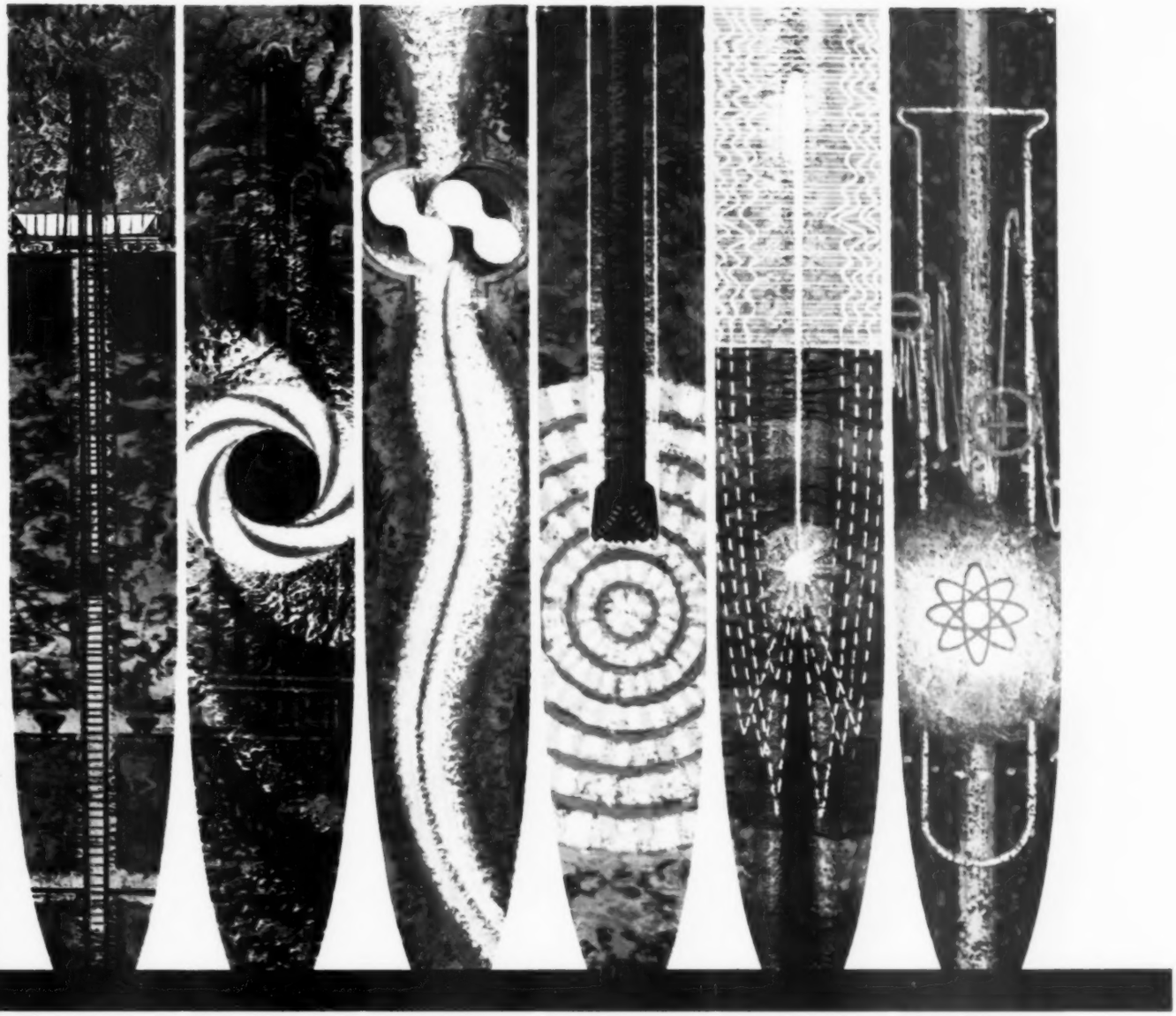

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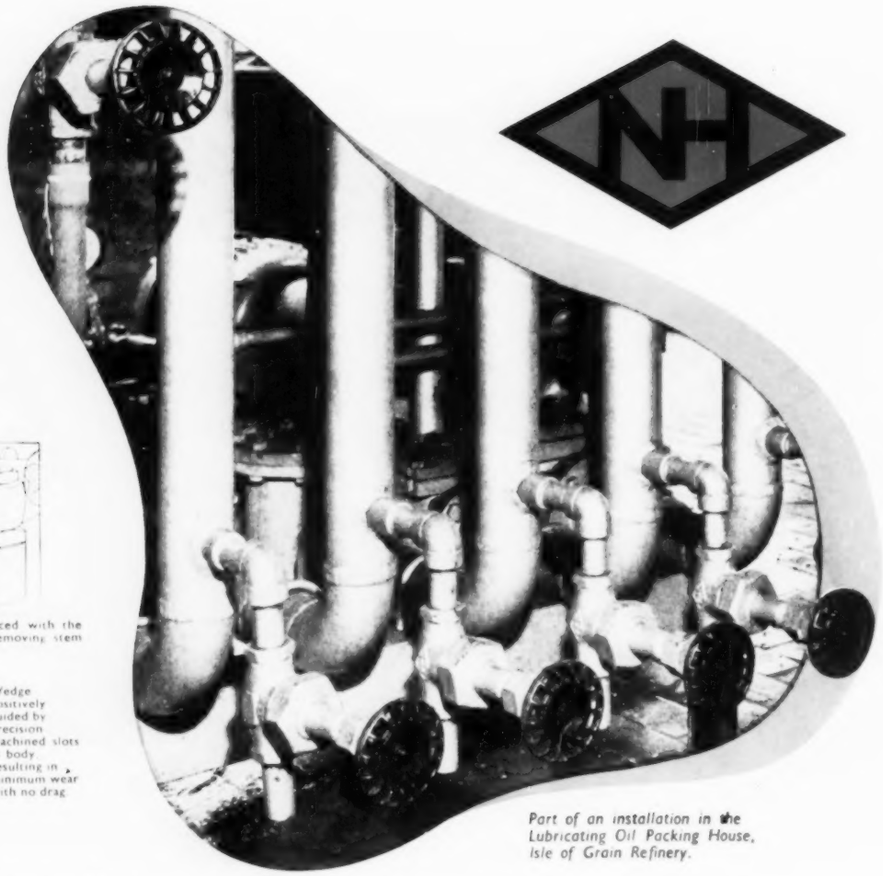
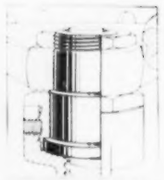
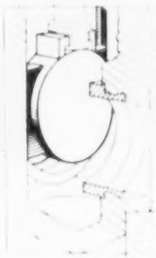


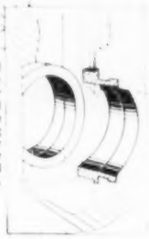
Part of an installation in the Lubricating Oil Packing House, Isle of Grain Refinery.



Yoke sleeve can be replaced with the valve in service without removing stem or bonnet.



Wedge positively guided by precision machined slots in body resulting in minimum wear with no drag.



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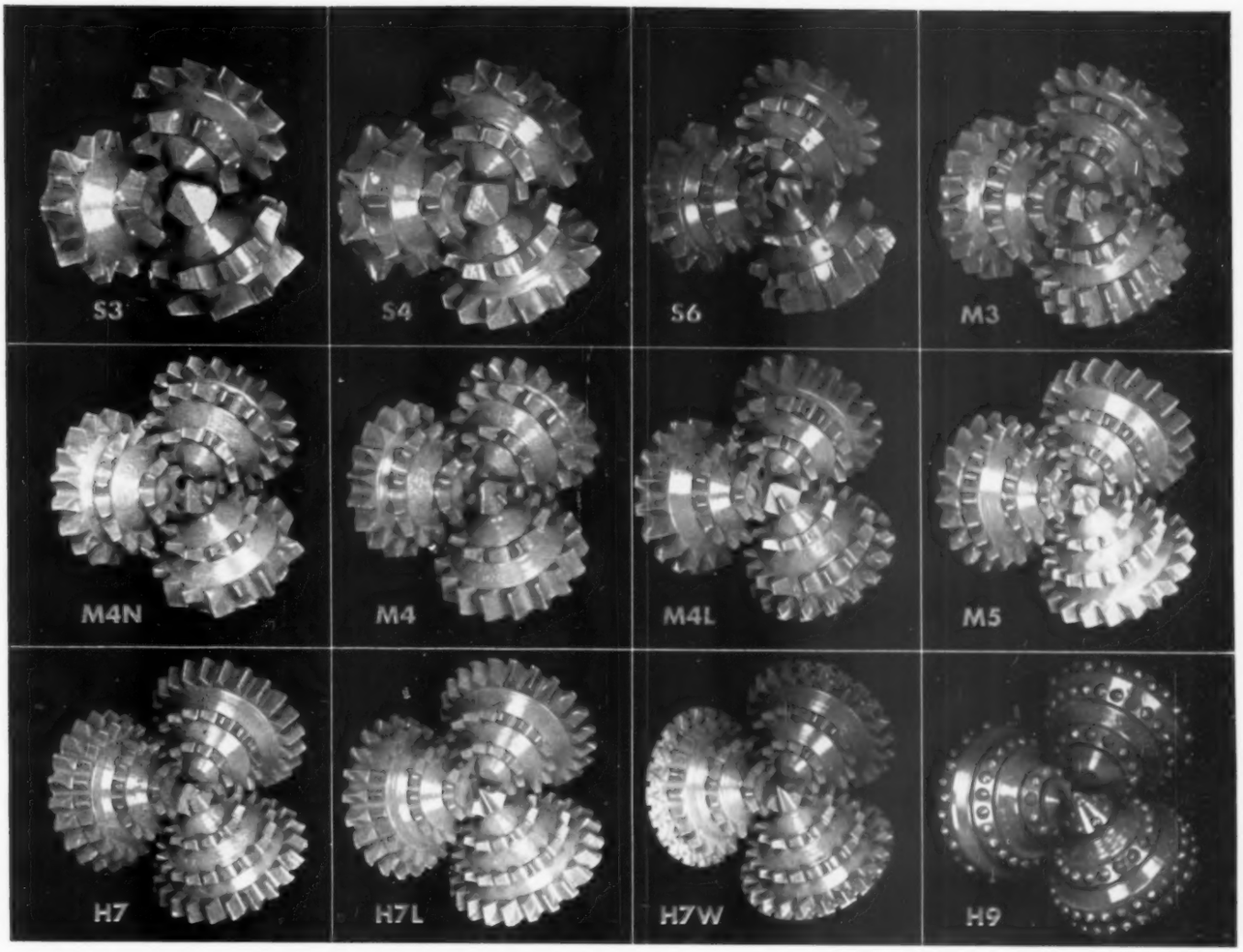

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LATIN AMERICAN OIL NEWS

Cuban Exploration Resumed

Exploration in Cuba has resumed with four wildcats drilling in Oriente, Camguey, and Havana provinces; and a new Mining and Geology Department, established by the revolutionary government, has initiated work on a long-needed detailed geological map of Cuba.

Trans-Cuba Oil Co. and Cuban Venezuelan Oil Voting Trust are drilling a 5,000-ft test on the Oriente coast near San Ramon, southeast of Manzanilla. Dixie Drilling Co. is conductor for the well which started February 16. Trans-Cuba and CVOVT have selected several additional locations in Oriente to test after completing this one.

Cuban Kewanee Oil Co. is drilling ahead on its joint wildcat with Atlantic Refining Co. on the north coast of Camaguey province, which was shut down in October 1958. This is the first of two tests planned in the area.

Empresas Petroleras Jones de Cuba is drilling a test in the Bacuranao field area east of Havana, and has reportedly concluded a contract with Salmon Oil Enterprise to drill a 3,000-ft test in the same area, which would earn Jones the right to drill 15 wells on Salomon concessions, of which five would be minimum 3,000-ft rotary tests and the balance cable-tool tests. Consolidated Cuban Petroleum is also drilling a cable-tool test in the Bacuranao area.

The revolutionary government has made the National Development Commission an agency of the Public Works Ministry and, as part of the commission, has created a new Mining and Geology Department headed by Ing. Jorge Soiglie. Ing. Jorge Brodermann, former head of the Cuban Geological Survey, is technical adviser. New staff members include Dr. Nicolas Herrera, former Esso geologist, and Rafael Diaz, former BANDES geologist. It is reported the department has offered the office of project director to Charles Ducloz, former Texas Co. geologist; the office of chief paleontologist, to Dr. Pedro Bermudez, Creole paleontologist in Venezuela; and the office of chief petrographer, to a University of Bern, Switzerland, professor.

The department's first project is preparation of a detailed geological map of Cuba, to be concluded within four years. A three months' training course in field mapping is being given to 82 Cuban engineers and doctors of science. The project's purpose, according to Dr. Brodermann, is to develop specialized information to accelerate exploitation of all Cuba's natural resources, particularly those which will result in the industrialization of the island.

Minister of Public Works Manuel Ray announced the National Development Commission is making plans for the use of the government-owned National 75 rotary rig in drilling and exploration.

Cuban daily production for January 1959 totaled 602 b/d, compared with 519 b/d in December 1958, and 1,385 b/d in January 1958.

New Colombian Company

Intercontinental Petroleum Co. Inc., with headquarters at 37 Wall St., New York, has been incorporated in Delaware to conduct geological and geophysical work, drilling and development, and production of oil and gas. Primary exploration will be in Colombia, but the company intends to investigate possibilities elsewhere in South America, as well as the Middle East and Europe. Officers of the company include Dr. A. Londono Palacio, president and chairman; Robert K. C. Rolus, executive vice president; Edgar J. Casel, exploration manager; Dr. Helen E. Williams, general treasurer; Karel Rolus, financial adviser; Dr. Alex Togores, administrative manager; and George S. Williams Sr., economics adviser.

The Intercontinental Petroleum Co. SA, a Colombian corporation, is a subsidiary of the aforenamed company. It holds concession rights over approximately 2,500,000 acres in Colombia.

Pan Am Argentine Producer

Pan American Argentina Oil Co. has completed drilling of two wells in the Cerro Dragon area of Comodoro Rivadavia, both at about 6,000 ft. Estimates of producing capacity await putting the wells into production.

The first well took 18 days, but the company expects this to be cut down in the future. Three more wells are being drilled, and the company was expected to have its seven drilling rigs and three termination units at work by the end of February. The first well was completed January 23, six months and two days after the company's contract with YPF had been signed. The second was completed five days later.

New Jamaica Refinery

An agreement to erect a 26,000 b/d oil refinery by Esso Standard Oil SA has been signed with the government of Jamaica, BWI. The new refinery's production, while it will find its way into the Jamaican petroleum products market, is also expected to be exported from centrally located Jamaica to other ports in the Caribbean. This will be Esso's first rfinery in the group of islands forming the Federation of the West Indies. Both Shell and Texas operate refineries in Trinidad.

Brazil Produces 50,000 B/D

Crude-oil production in Brazil in 1958 came to 51,843 b/d, according to Petrobras. Production of refined products, on the basis of figures from the National Petroleum Council, was as follows:

	BARRELS
Signal oil	1,007
Aromatic residues	208,139
Ethylene	19,887
LPG	2,050,853
Gasoline	18,001,987
Kerosine	1,936,782
Solvents	740,465
Diesel oil	6,097,789
Fuel oil	18,647,169
Asphalt	917,404

Bolivia's Exploration & Output

Crude-oil production in Bolivia was 9.413 b/d in 1958, a drop of 3.9% from 1957. Consumption of diesel oil dropped 43% to 265,125 bbl, and consumption of crude by refineries was down, but there were increases in use of gasoline of 14%, and of fuel oil, kerosine, and imported aviation gasoline. Use of automotive gasoline has increased regularly in the past decade except for a slight decrease in 1957.

YPFB drilled 10 exploratory and 24 development wells, the largest number in each case in its history in a single year.

Consumption Stagnates

Consumption of oil products in Colombia during 1958 came to 16,695,000 bbl, a rise of 0.4% from the total of 16,629,000 bbl in 1957. The 1957 total was only 0.5% above 1956. Consular reports attribute this virtual "stagnation" of the increase in demand, which had been at an annual rate of 15%, to an almost complete ban on automobile imports.

Cuban Oil Declines

Crude-oil production in Cuba came to 941 b/d in 1958, down 13% from 1957. The last year's output was 37% under the record output of 543,121 bbl in 1955. The revolution is given as only part of the reason for the decline. Drilling was off to 139,415 ft drilled last year, compared to 195,859 ft in 1957; 272,678 ft in 1956; and 249,831 ft in 1955. Indications are that 1959 production will be about the same as last year's.

Trinidad Oil Strike

Dominion Oil offshore well in Trinidad tapped a relatively rich gas consolidate area of 48 API gravity. Company said release of pressure from the reservoir produced a chemical process which transformed a high percentage of gas into oil before reaching the surface. Further testing is under way to determine commercial possibilities, but company expresses cautious optimism.

A second rig has been ordered from USA, and addition holes will be drilled in the area now opened. The hole was a producer at 11,387 ft in the Gulf of Paria, the first successful test by Dominion Oil in Trinidad after seven years of drilling. This is Dominion Oil's fourth in the gulf, and the deepest drilling ever attempted from a floating platform. Because of depth and pressure, drilling was discontinued within 24 hours of discovery.

Venezuelan Oil Minister

Venezuela's President Betancourt has named his colleague, Dr. Juan Pablo Perez Alfonso, new minister of mines and hydrocarbons.

Venezuelan 60-40 To Stick

Venezuelan President Betancourt said recent Venezuelan tax change, which has brought oil-sharing formula up to 60-40 from previous 50-50, will be maintained. Revision of commercial treaty between USA and Venezuela will be sought immediately, said Betancourt on taking office as Argentina's new president.

Colombia Hikes Oil Prices

Effective January 1, 1959, the government of Colombia hiked oil-product prices to a "realistic, world-price basis." Motor gasoline in Bogota—which formerly cost 0.846 peso per gallon—is now 0.956 at service station.

Bolivian Oil Institute

A Technical and Scientific Oil Institute has been formed in La Paz, known as the Institute Boliviana del Petroleo. President is Alfonso Romero L., general manager of YPFB. Vice President is Benjamin Hake, general manager of Bolivian Gulf.

Oil in Peru Reviewed

Oil exploration slowed in Peru during the past 12 months as Texas Petroleum Co. withdrew from the Yurimaguas area, after having drilled a 7,591-ft dry wildcat, and relinquished its 2/3 share in Petrolera Yurimaguas SA. The 488,789-hectare concession of Petrolera Yurimaguas is now held by El Oriente Co. alone. Texas abandoned also about 850,000 hectares, or 2.1 million acres in eastern Peru in the Marañon area.

El Oriente Co. has completed its tenth well in the Maquia field. Well No. 9 tested 300 b/d and No. 10 150 b/d. The company has suspended drilling, and is now preparing to start commercial production about mid-1959. Storage tanks are being constructed at its river port, Puerto Oriente, on the Ucayali River, and the four miles pipeline from the field to the river have been completed.

In Sechura, Amotape Oil Co. produced 6,427 bbl in December 1958. Peruvian Pacific Petroleum Co. acquired in the last auction of offshore concessions an additional acreage of eight concessions on the continental shelf in a total extension of around 91,000 acres. Since December, it has carried out seismographic surveys on its concessions on the shelf, and expected by the beginning of March the arrival of a drilling barge in Talara, capable of drilling 7,500 ft at a water depth of 200 ft. Cost of the barge, including four accompanying barges, is reported at 2 million.

Output of Ganso Azul in 1958 amounted to 712,147 bbl, a slight decline against the output of 780,330 bbl in the preceding year. Gasoline prices in Peru were not increased in 1958; a new tax for the government was established, with a small increase for the filling station dealers. Price of ordinary motor spirit at filling stations is at present exchange about US 8¢ per gallon including all taxes.

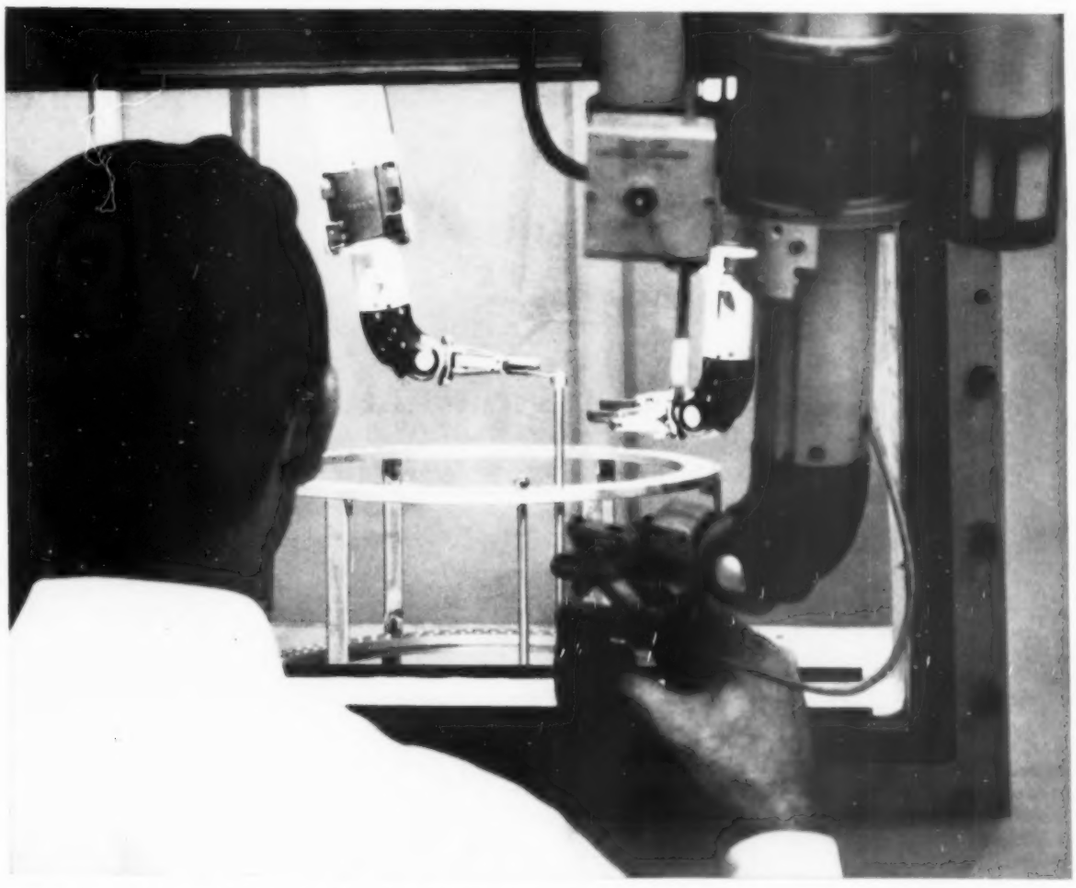
Brazil Wildcats

In Alagoas state, on the east coast of Brazil, Brantley Drilling Co. of Midland, Texas, will drill 25 wells for government's Petrobras. The 6,000-ft tests will be in a 37-mile by 9-mile area hitherto unproductive.

NEWS ON TEXACO PROGRESS—RESEARCH

Oil research—from test tube to radioactive cobalt

YESTERDAY. Decades ago, Texaco scientists worked with relatively crude laboratory equipment, as they probed the fundamental mysteries of oil. Nevertheless — thcugh early oil research was primitive — it resulted in important improvements in petroleum products. Many of these improved products were pioneered by Texaco.



TODAY. Texaco scientists continue their search for basic petroleum knowledge, now using such ultramodern tools as radioactive Cobalt-60 in one of the world's most fully-equipped industrial research laboratories. This is only part of Texaco's great research center at Beacon, N. Y., one of the Company's four modern research centers. Hundreds of Texaco scientists are continually working to create new and better products for more and more people.

TEXACO

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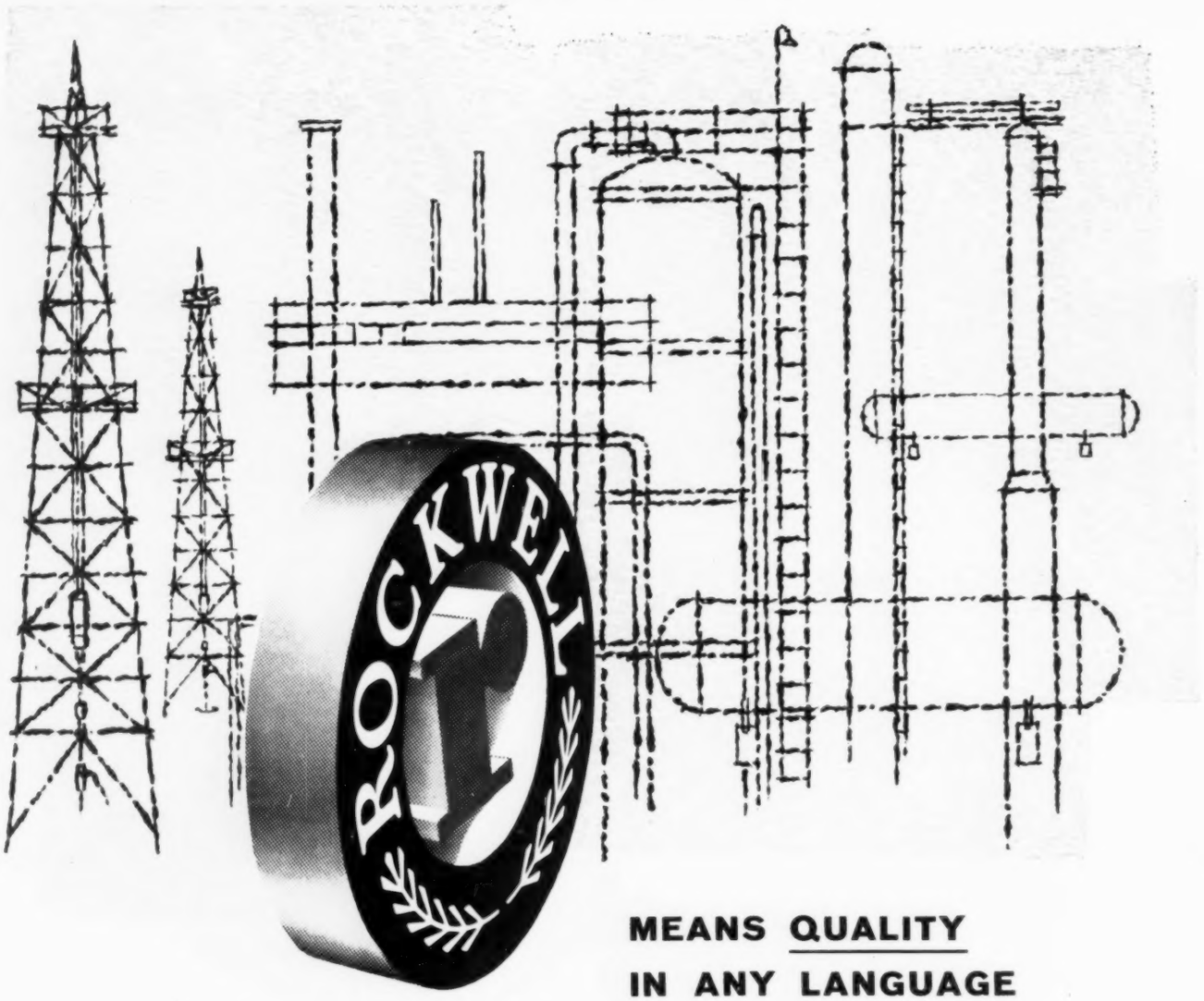

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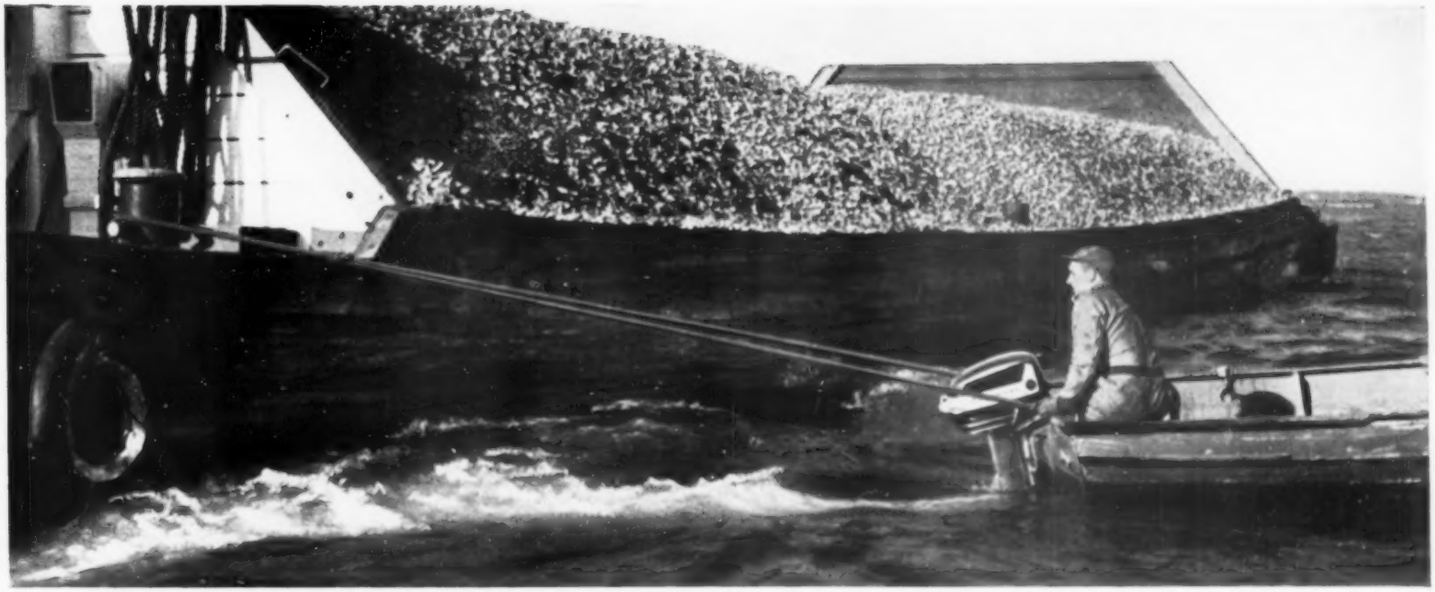

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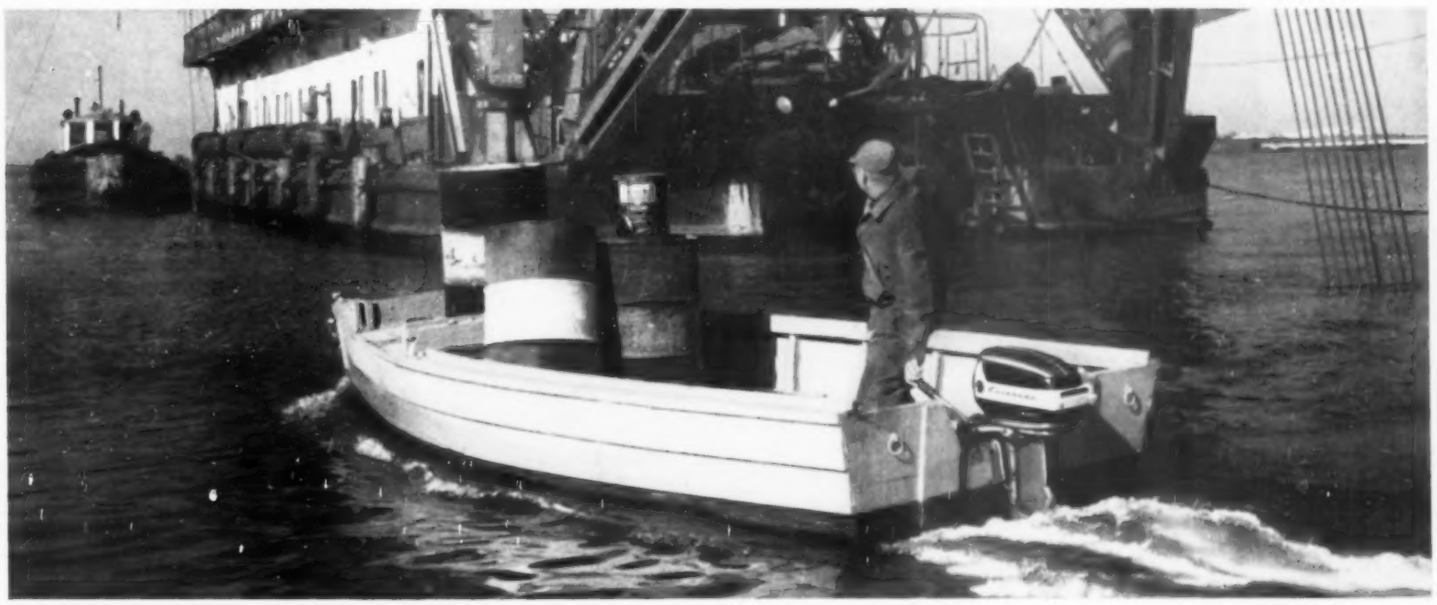

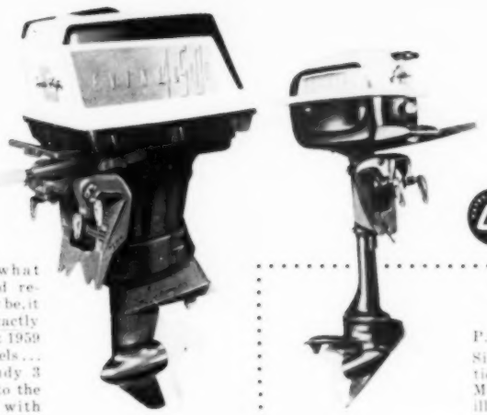

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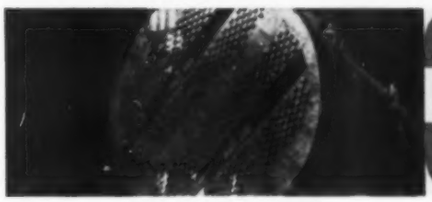

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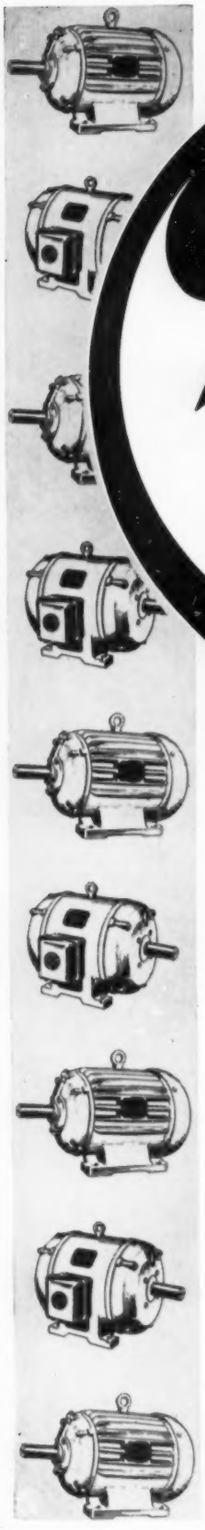

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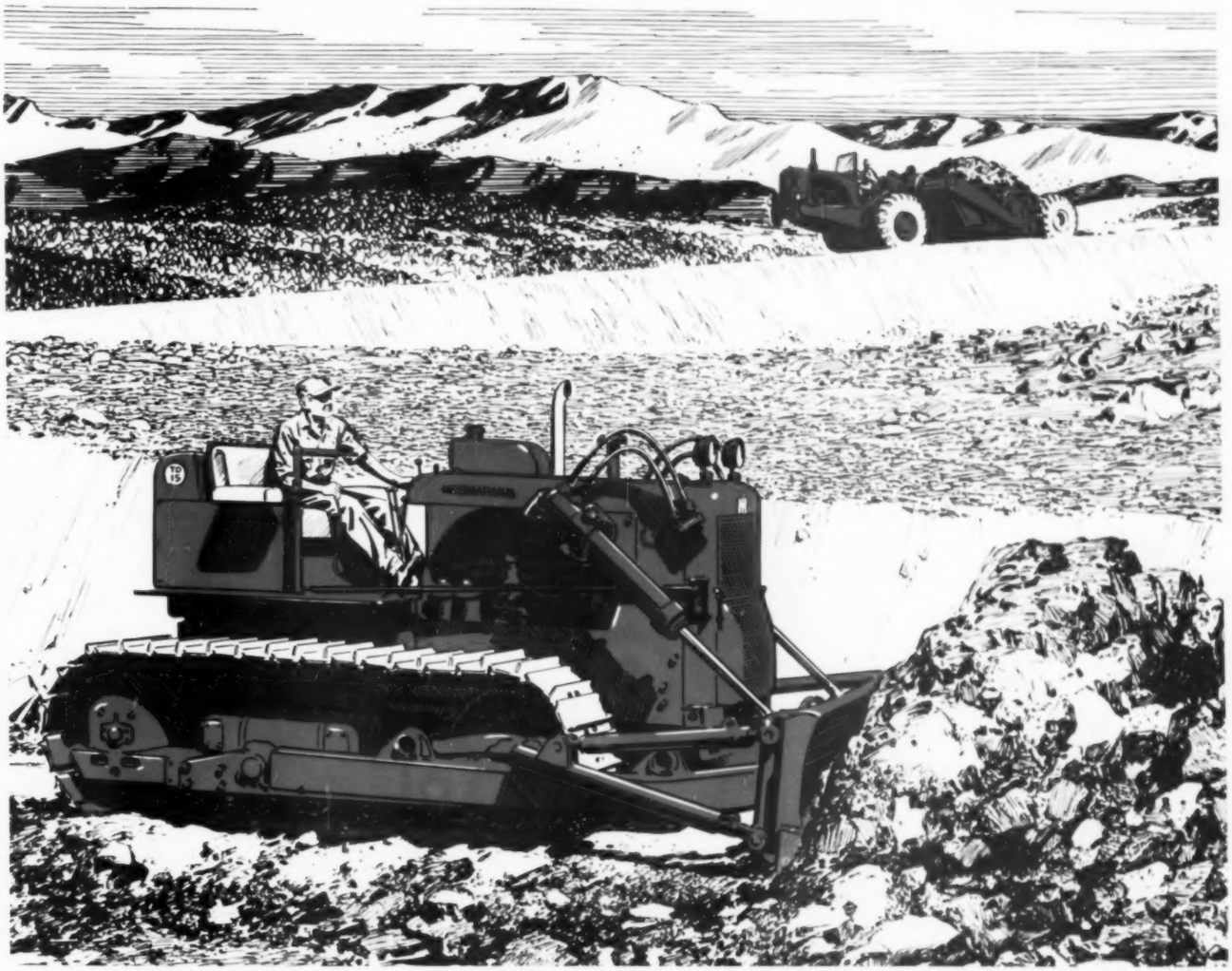

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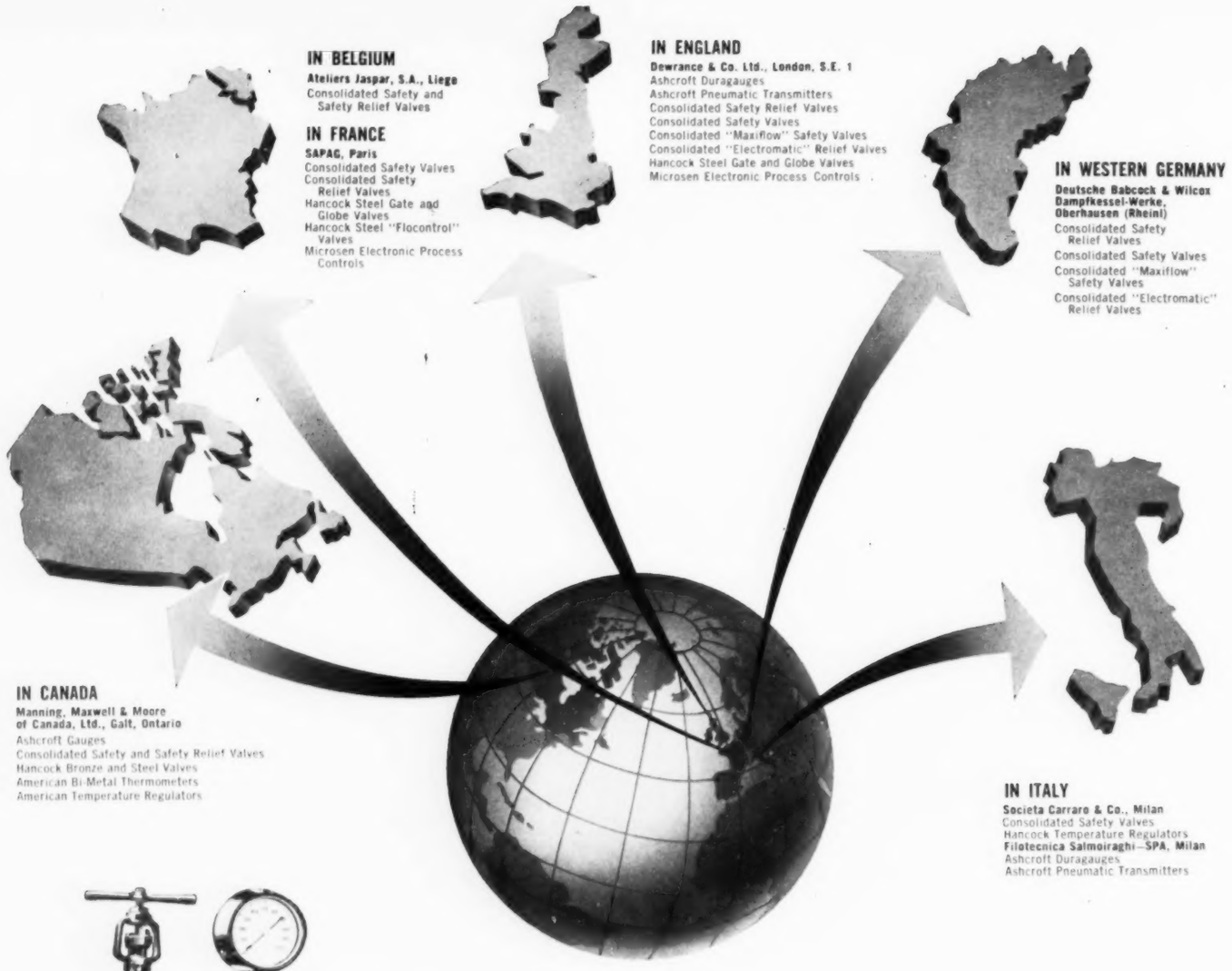


IN BELGIUM
Ateliers Jaspar, S.A., Liege
Consolidated Safety and Safety Relief Valves

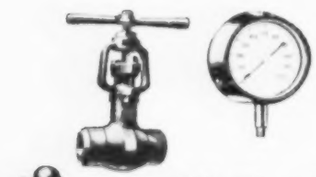
IN FRANCE
SAPAG, Paris
Consolidated Safety Valves
Consolidated Safety Relief Valves
Hancock Steel Gate and Globe Valves
Hancock Steel "Flocontrol" Valves
Microsen Electronic Process Controls

IN ENGLAND
Dewrance & Co. Ltd., London, S.E. 1
Ashcroft Duragauges
Ashcroft Pneumatic Transmitters
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves
Hancock Steel Gate and Globe Valves
Microsen Electronic Process Controls

IN WESTERN GERMANY
Deutsche Babcock & Wilcox Dampfkessel-Werke, Oberhausen (Rheinl)
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves

IN CANADA
Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario
Ashcroft Gauges
Consolidated Safety and Safety Relief Valves
Hancock Bronze and Steel Valves
American Bi-Metal Thermometers
American Temperature Regulators

IN ITALY
Societa Carraro & Co., Milan
Consolidated Safety Valves
Hancock Temperature Regulators
Filotecnica Salmoiraghi—SPA, Milan
Ashcroft Duragauges
Ashcroft Pneumatic Transmitters



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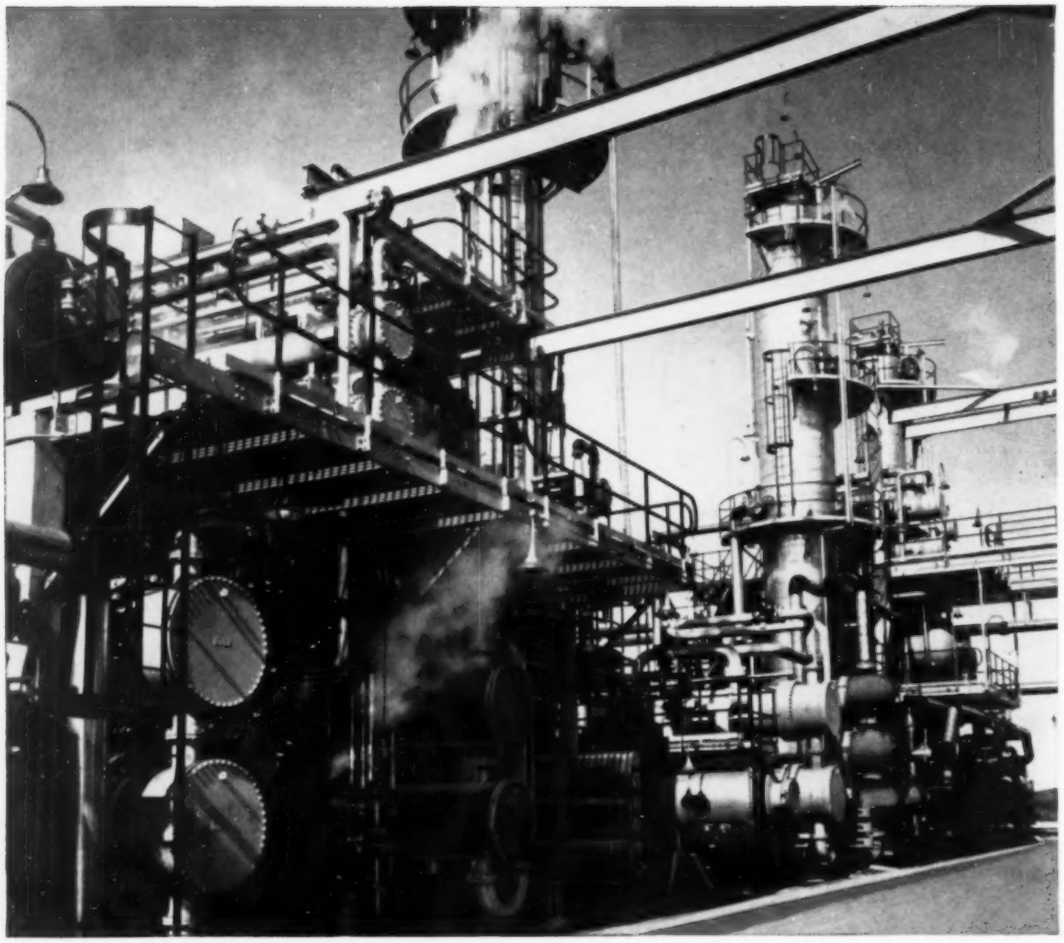

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SWEDEN: A.B. Scania Vabis, Sodertalje
SWITZERLAND: Fratelli Ambrosoli, Zurich 1
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LIBYA: La Mandataria Ltd., Tripoli
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REUNION ISLAND: Samat & Cie, Saint Denis
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SUDAN: Franco Porto (Sudan) Ltd., Khartoum
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JORDAN: Eastern Company, Amman
KOREA: Eisenberg & Company, Inc., Seoul
KUWAIT: Saleh Jamal & Company, Kuwait
LEBANON: Ed. Trading Company, Beirut
MALAYAN FEDERATION: Cycle & Carriage Company (1926) Ltd., Singapore
MARIANAS ISLANDS: Consolidated Motors Inc., Agana, Guam
NEW CALEDONIA: Agence Alma, Noumea
NEW GUINEA: Colyer Watson (New Guinea) Ltd., Rabaul
NEW ZEALAND: Campbell Motors, Ltd., Auckland; South Island Motors, Ltd., Christchurch, C.1.
PAKISTAN: Eastern Automobiles, Ltd., Karachi 3
PHILIPPINE ISLANDS: Liberty Motors Inc., Port Area, Manila
PORTUGUESE INDIA: Visnum V. Camotin Tarcar, Nova Goa
PORTUGUESE TIMOR: Sociedade Agricola Patria e Trabalho, Lda., Dili
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STANDARD OIL COMPANY OF CALIFORNIA

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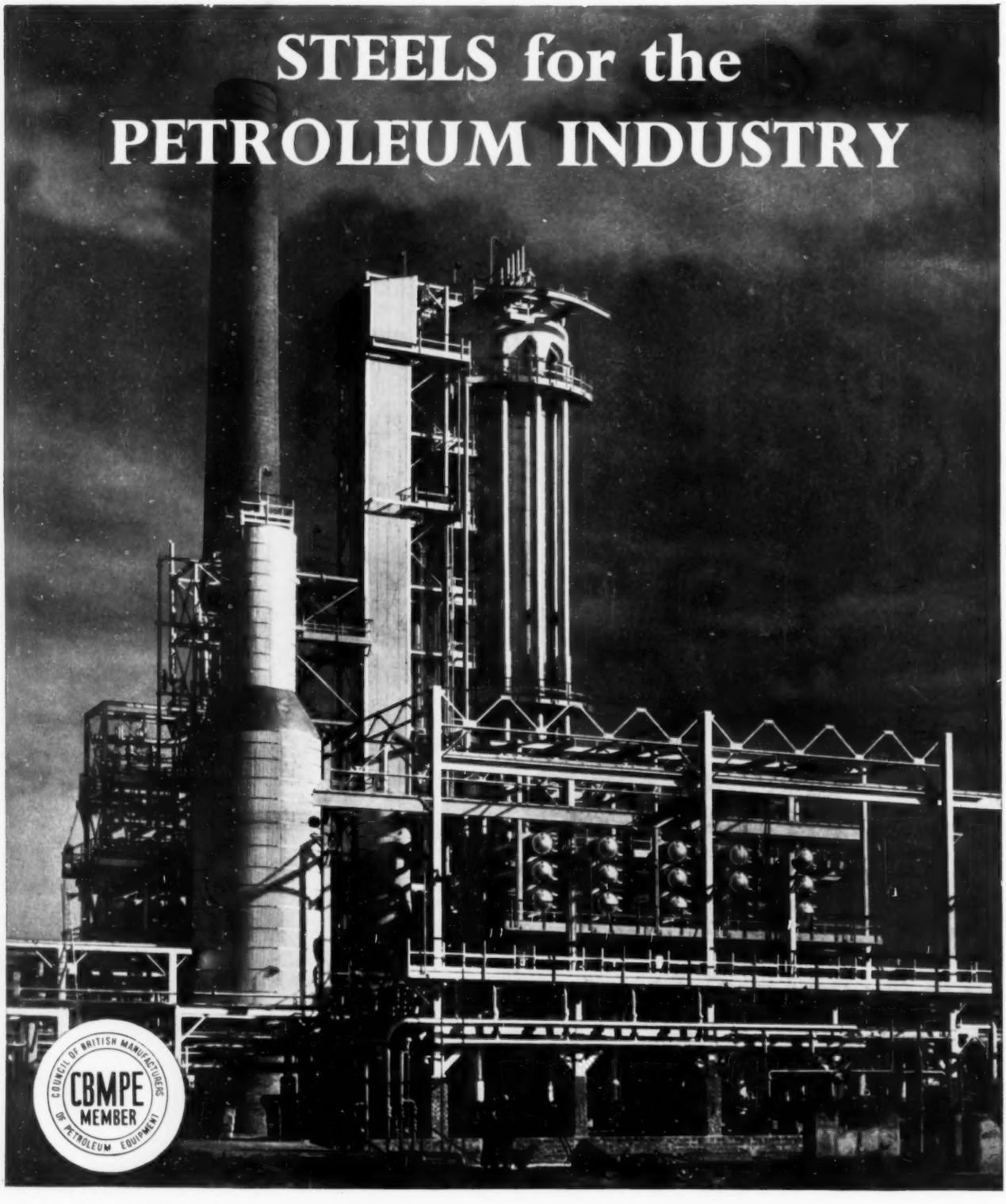

"A Symphony In Steel" — *A British Petroleum Company photograph*

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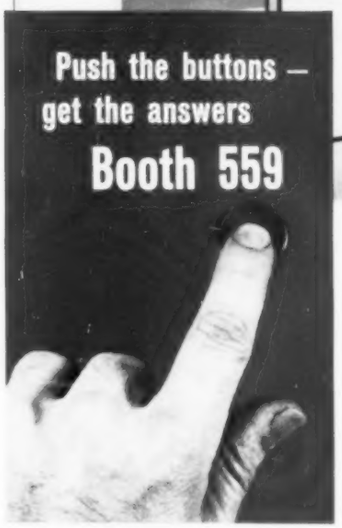

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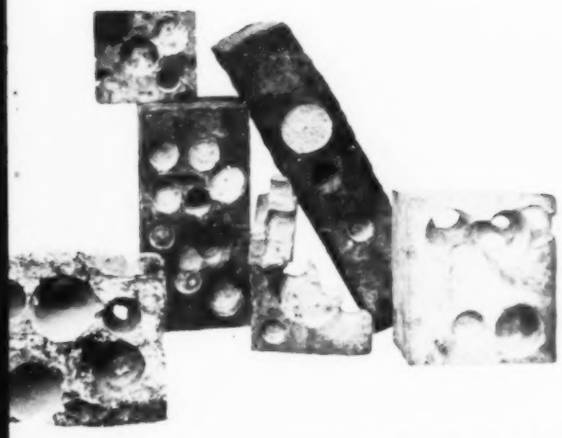

HALF CENTURY OF DRILLING RESEARCH HAD ITS BEGINNING IN A UNIQUE LABORATORY

THE LIGHT that shone from the door of the first Hughes research laboratory was dim indeed compared with the blaze of light that shines today, a half century later, from the block-long Research and Engineering Laboratory in Houston, Texas.

That first laboratory was housed in a small wooden derrick, erected alongside the company's first plant. Corrugated iron enclosed the lower part of the derrick. Ivy and moon flowers covered most of the structure. The machine set up in the laboratory to simulate rotary drilling was steam-driven. The holes it drilled in blocks of rock made possible the first analysis of the performance of rock bits.

Research started 50 years ago has continued without interruption and has grown from year to year. For many years, the only drilling research being done was that carried on by Hughes. And in those early years of rotary drilling, oil companies frequently used the Hughes research laboratories for metallurgical, chemical and physical analysis of materials.

The present two-story Hughes Research and Engineering Laboratory building, built in 1952 and further enlarged in 1958, houses the largest drilling laboratory in the world. But the policy that guides its operations is the same as that set forth at the start of Hughes research: "never to be satisfied . . . and to continue to anticipate the ever-changing requirements of the drilling industry."

BIRTHPLACE OF DRILLING RESEARCH

In the painting at the left, the artist, in this night scene, has attempted to capture something of the loneliness and mystery of the work carried on in the first Hughes laboratory. Enlarged prints in full color are available for the asking. Write: Advertising Department, Hughes Tool Company, P. O. Box 2539, Houston, Texas.

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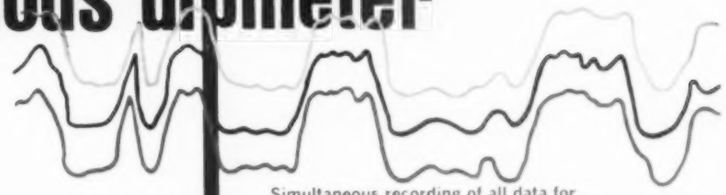

Simultaneous recording of all data for

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- formation dip orientation
- hole deviation
- hole size

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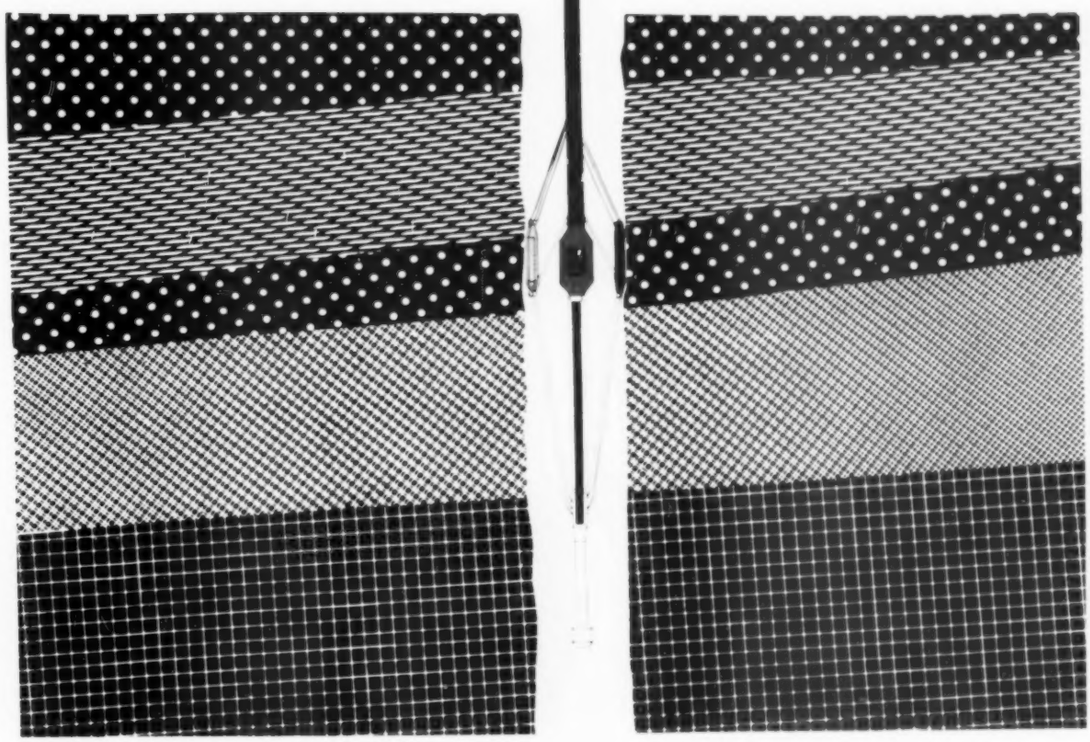

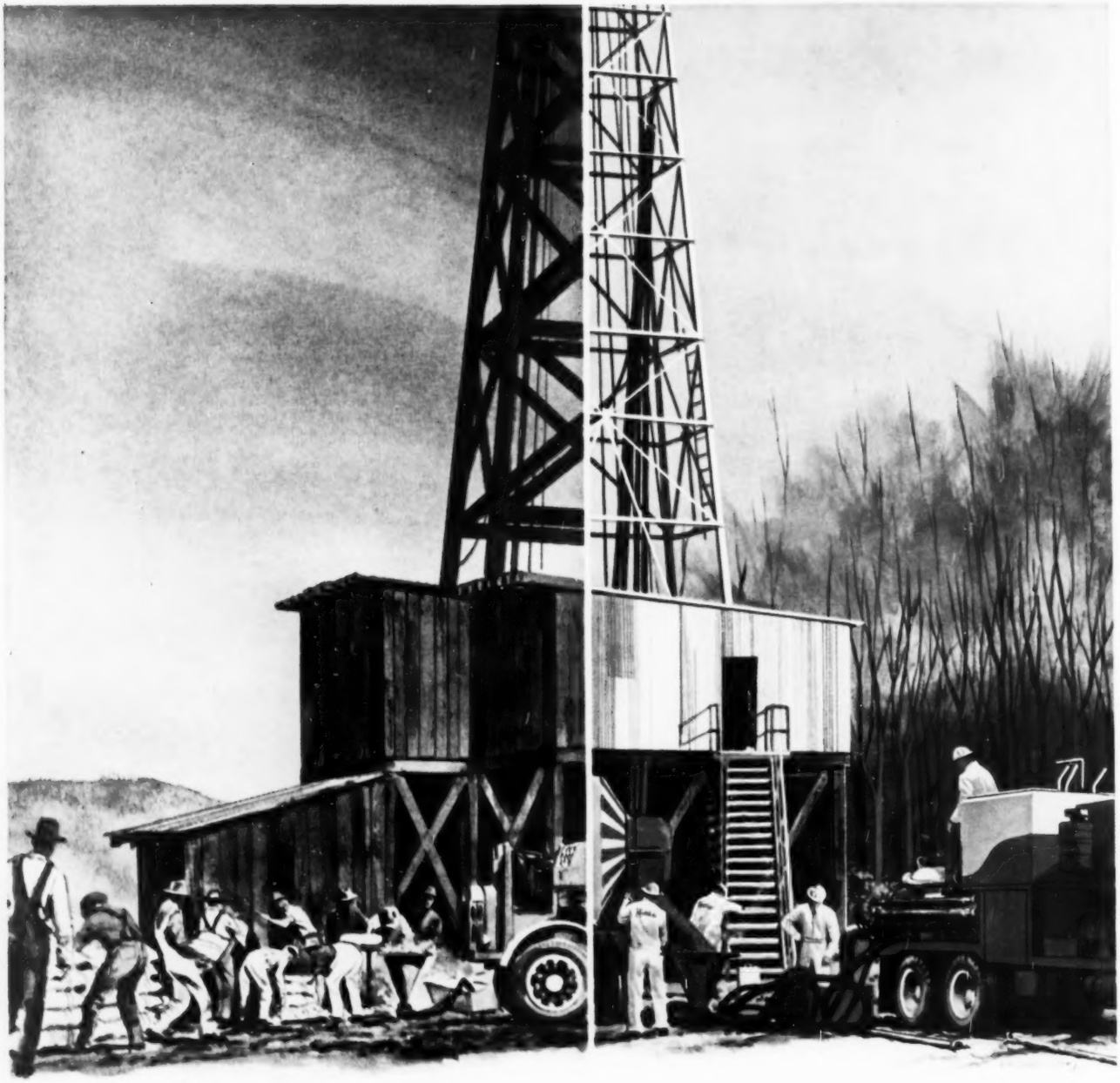

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It's still a tradition at Halliburton to carry on the sage advice of our founder: "Don't ever stop trying to make things or do things better."

Every employee of this company believes in this principle. The benefits are increasingly evident by the mute testimony of the many successful wells cemented in the free world.

To maintain this leadership, we re-dedicate the future to "making things and doing things ever better" . . . to serve the petroleum industry in a future that promises big rewards to those who accept the challenge.

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"Continue To Look To Halliburton — for Leadership"

Our petroleum and natural gas future

By E. C. Babson

Chairman of the Board of Governors,
Canadian Petroleum Association
Division Manager, Union Oil Co. of California

CANADA'S petroleum and natural gas exploration and development industry enjoyed a period of vigorous growth between 1947—the year of the Leduc oil discovery in west-central Alberta—and the end of 1957.

With the beginning of 1958 came a period of reduced production which, during the year, averaged only half the Canadian capacity to produce under sound conservation practices. Furthermore, there were—and are—870 idle natural gas wells in the province of Alberta alone, despite the completion of the World's longest gas line (the Trans Canada Pipe Line) from Alberta, through heavy potential customer areas to Montreal.

The principal causes of this situation which is persisting into 1959 are threefold:

A less than normal increase in domestic demand as a result of the business recession.

The loss of crude oil export markets to lower cost offshore oil.

Delay on the part of the Federal Government in authorizing additional large-scale natural gas export.

The prevailing atmosphere has not been improved by the publishing of the First Report of the Royal Commission on Energy—known as the Borden Commission. This investigating body, after subjecting the industry to close scrutiny, recommended basic changes in present regulatory practices, and the extension of regulatory authority on a very broad scale to almost all phases of the industry.

The Canadian Petroleum Association, representing an overwhelming percentage of industry opinion, submitted to the Federal Government and to the public, a policy statement expressing concern over some of the recommendations of the Commission, and fear that the uncertainties created by the proposed federal controls will further delay the marketing of idle gas reserves.

Despite these difficulties, exploratory work has been carried on at an active pace. The play has spread into remote areas of northern British Columbia, the delta of the Mackenzie River on the Arctic shore of Canada, and even into the Canadian Arctic islands where oil companies in 1959 have filed on some 80 million acres.

The level of development drilling has decreased substantially from that of 1957 and 1958. Besides the shrinking of markets, an important factor was the drilling up in 1957 of both the Pembina Field in Alberta, and the newer fields of south-eastern Saskatchewan. It was unfortunate for the drilling contractors and the service companies that these two major development campaigns occurred at the same time, because the abnormal demand for equipment and facilities during 1956 and 1957 resulted in much equipment lying idle in 1958.

The available supply of both oil and natural gas by far exceeds present market demands, and new discoveries are increasing the margin every year. The industry's principal problem at this stage is to find new market outlets. Although the crude oil marketing situation is complicated by the competing pressure of low-cost off-shore oil, economic markets for Canadian natural gas exist at the present time.

The Alberta Oil and Gas Conservation Board recently has processed two applications for large-scale gas export to the United States. These, if fully approved by the Alberta and the Federal governments should constitute an important move in stepping up the output of Alberta gas, a great percentage of which at the present time is shut in awaiting markets. Canada has the resources, but only when they are efficiently produced and economically used can they create additional capital which Canada must have at this stage of her expanding economy.

END

Canada's 1958—year of contrasts

Natural gas shone during 1958, with production up a startling 53% while crude oil production fell 9%. Other highlights of the year included Ontario's becoming Canada's largest oil market; refining up 7.7%; the world's largest pipeline for gas completed; and oil-product demand up 9%.

For the oil industry in Canada, the year 1958 was in many ways an upside-down reflection of 1957. The two years were straddled by a business recession, the most severe since the war; and, while 1957 began with the buoyant carryover associated with Suez, 1958 ended with a reviving economy and an early, cold winter which boosted oil sales and greatly increased crude production. In other words, 1957 started strong and finished soft, while 1958 inherited a slow beginning and closed on a note of healthy recovery.

1958 was also a year of contradictions. Crude production failed to show an increase over the previous year for the first time since the war, and product demand reached record levels. Drilling activity was curtailed markedly, and one of the world's most prolific gas wells was discovered. The world's longest natural-gas pipeline was completed, and the problem of additional markets for Alberta natural gas reappeared.

Another highlight of the year was the activity of the Borden commission, or the Royal Commission on Energy, to give its full title. This body was appointed in October 1957 to study all aspects of production, distribution, export and import of all energy forms, and the possible constitution and functions of a national energy board. The first nine months of the year brought forth a unique documentation of the industry in Canada, as large and small companies alike presented briefs and elaborated in oral testimony. In October, the commission tabled its first interim report covering natural gas, oil and gas pipelines, and the question of a national energy board. The second report, believed to cover the subject of crude-oil markets, was expected by May of this year.

*Crude Production**: 1958 was Canada's third best year with regard to production of crude oil. The all-time record of 500 mb d was achieved in 1957, and the previous best had been 470 mb d the year before. Production figures had in fact increased steadily since 1947, and 1958 was the first break in the trend when the total was 455 mb d, 9.0% below the preceding year.

The level of production ranged from 518 mb d in February down to 401 mb d in April, and up again to 506 mb d by year-end. Alberta production was down 17.5%, Saskatchewan up 21.8%, and Manitoba down a fraction. British Columbia, still in the early stages of development, more than doubled. Table I shows the disposition of Canadian crude production during 1958. Alberta was the principal source, with 311 mb d; and Ontario was the area of greatest demand, taking 164 mb d and displacing the Prairie Provinces which had traditionally been their own best customer. The emergence of Ontario as the largest regional market for Canadian crude oil was one of the most significant developments of 1958. 35.5% of Alberta and 36.6% of Saskatchewan production was shipped to Ontario. In the case of Manitoba, Ontario was second to the USA upper Mid Continent area, but

Discovery well Shell-Petrol-Explorers-Simon shown at night with Shell drilling foreman B. W. Little in foreground. Located about 130 miles west-northwest of Edmonton, Alberta, the well was completed in the Leduc reef formation with an initial potential of 528 b/d of light oil. Four follow-up tests will be drilled simultaneously, in the same general area as soon as rigs can be moved into the new location.

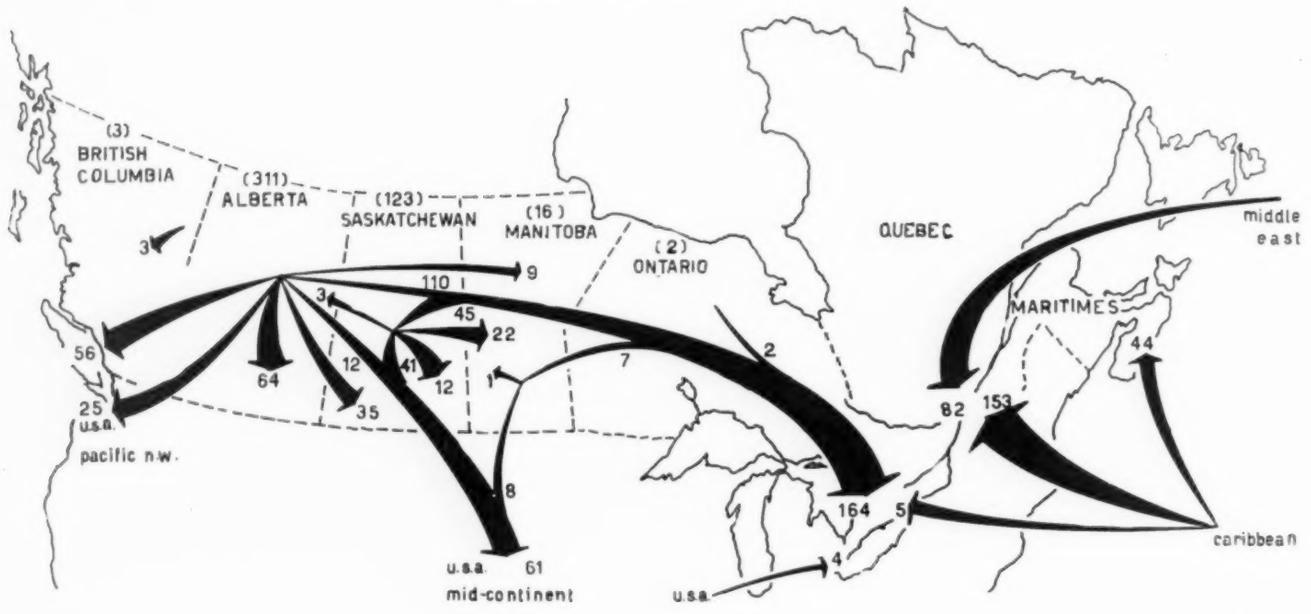
* The notation mb d as used herein signifies thousands of barrels daily, using standard U.S. barrels of 42 gallons.

E. C. SIEVWRIGHT, assistant to the vice president in charge of transportation and supplies for Shell Oil Co. of Canada, is a graduate of London University (B.Sc. in economics) and McGill University (M.A.). He joined Shell in 1953 as technical assistant; and was appointed assistant manager of the head office, economics and planning department, in 1957. He has since been named assistant to the vice president, transportation and supplies.

Disposition of Canadian Crude Oil Production and Foreign Crude Imports 1958

All figures in thousands of barrels per day

Provincial production noted by ( )



still took 43.8% of total production.

The reason for the divergent movements lies in the markets which these provinces had built up in 1956 and 1957. Alberta in 1957 exported 93 mb/d to USA markets in the Pacific Northwest and California. With the return of more normal conditions following the Suez disturbance, and the continuance of depressed tanker rates, 1958 exports to these areas totaled 25 mb/d—all to the Pacific Northwest. This 68 mb/d reduction was offset in part by an increase of 18 mb/d, or 19.6%, in movements of Alberta crude to Ontario. Saskatchewan, on the other hand, increased shipments to USA points by 27.3%, and to Ontario by 18.4%. Table III shows how Saskatchewan continued to increase its share of total Canadian crude production, rising to 27.0% compared to a very modest 2.3% in 1951. All regions have in fact been gaining at the expense of Alberta, which for so long dominated 95% of the crude-oil business in Canada.

In the spring of 1958, western Canada cumulative production passed the one-billion-barrel mark, and Alberta alone should achieve this production some time during 1959. This emphasizes the dominant role which Alberta has played in the postwar oil development of western Canada. Potential production (MER) was about one million barrels per day during 1958, of which 800 mb/d was in Alberta. Production moved from about 40% of potential in the early part of the year to 50% at year-end. Alberta was the hardest hit by shut-backs, producing at a low of 33% in April and recovering to 46% in December.

Drilling activity in western Canada was off markedly from the previous year. The first three months started off well with an average of 250 rigs in the field. The big drop came after the spring thaw and resultant road bans, when the average was reduced to 170 rigs compared with about 235 last year. Table IV shows that, while all development drilling in western Canada was down an average 24 rigs, 21 of these were in Saskatchewan, with Alberta showing a small gain. In exploration drilling, the reduction was 20 rigs compared with 1957, and again Alberta fared better than other areas. Overall, Alberta had about the same number of rigs in the field as in the previous year, while Saskatchewan was down 46.7% and other areas 40.6%. Geophysical survey parties were down by 17.3%, with Alberta showing a 26.3% loss and Saskatchewan up by 14.3%. At the beginning of the year, operators in western Canada were confident crude-oil markets would resume their growth, and that new natural-

TABLE I—DISPOSITION OF CANADIAN CRUDE-OIL PRODUCTION[1]—1958

(Thousands of barrels per day)

Source	Destination							
	B.C. & N.W.T.	Alberta	Saskatchewan	Manitoba	Ontario	USA Pacific Northwest	USA Mid Continent	Total
British Columbia and N.W.T.	3	—	—	—	—	—	—	3
Alberta	56	64	35	9	110	25	12	311
Saskatchewan	—	3	12	22	45	—	41	123
Manitoba	—	—	—	1	7	—	8	16
Ontario	—	—	—	—	2	—	—	2
Total	59	67	47	32	164	25	61	455

1 Partly estimated. Does not include natural-gas liquids.

TABLE II—CRUDE PRODUCTION[1]

(Thousands of barrels per day)

Year	Alberta	Saskatchewan	Manitoba	Other[3]	Total
1951	126	3	—	1	130
1952	161	5	—	1	167
1953	211	8	2	1	222
1954	241	15	6	1	263
1955	311	31	12	1	355
1956	393	58	16	3	470
1957	377	101	17	4	499
1958[2]	311	123	16	5	455

1 Excluding natural-gas liquids.
2 Partly estimated.
3 Includes British Columbia, Northwest Territories, and eastern Canada.

TABLE III—CRUDE PRODUCTION
% DISTRIBUTION BY PROVINCES

Year	Alberta	Saskatchewan	Manitoba	Other[1]
1951	96.9	2.3	—	0.8
1952	96.4	3.0	—	0.6
1953	95.0	3.6	1.0	0.5
1954	91.6	5.7	2.3	0.4
1955	87.6	8.7	3.4	0.3
1956	84.2	12.0	3.4	0.4
1957	75.6	20.2	3.4	0.8
1958[2]	68.4	27.0	3.5	1.1

[1] Includes eastern Canada, Northwest Territories, and British Columbia.
[2] Partly estimated.

TABLE IV—DRILLING ACTIVITY IN WESTERN CANADA—1956-1958

	Average Monthly Number of Rigs in the Field									Geophysical Survey Parties		
	Development Drilling			Exploration Drilling			Total					
	1956	1957	1958	1956	1957	1958	1956	1957	1958	1956	1957	1958
Alberta	105	76	79	64	62	57	169	138	136	86	76	56
Saskatchewan	41	43	22	23	19	11	64	62	33	20	21	24
Other Areas	13	10	4	13	22	15	26	32	19	18	13	11
Total	159	129	105	100	103	83	259	232	188	124	110	91

TABLE V—WELL COMPLETIONS IN WESTERN CANADA—1956-1958

	Oil			Gas			Dry			Total		
	1956	1957	1958	1956	1957	1958	1956	1957	1958	1956	1957	1958
Alberta	1,368	877	995	138	137	174	352	413	482	1,858	1,427	1,651
Saskatchewan	791	853	508	11	18	16	291	334	254	1,093	1,205	778
Manitoba	195	135	65	—	—	—	56	91	26	251	226	91
British Columbia	6	10	15	35	48	26	15	34	47	56	92	88
Total	2,360	1,875	1,583	184	203	216	714	871	809	3,258	2,949	2,608

gas outlets would be authorized.

Total well completions during the year fell from 2,949 in 1957 to 2,608, due to sizeable declines in Saskatchewan and Manitoba (Table V). Oil wells completed declined by 15.6%, dry holes by 7.1%; while gas completions gained by 15.7%, with oil wells up 13.5%, gas up 27.0%, and dry holes up 16.7%. In other areas, the most significant decline was in Saskatchewan, where oil completions declined from 853 to 508, or 40.4%.

Discovery wells declined from 145 to 125 during 1958, oil discoveries being down 30.0% and gas discoveries up 22.2%. In Alberta, oil discoveries were 25.5% below 1957, and gas finds up 8.1%. In Saskatchewan, oil discoveries were down 11.8%, and gas declined by 25.0%. One of the more significant aspects of the 1958 program was the increase in natural-gas discoveries in eastern British Columbia—up to 12 from 4 during 1957.

A significant crude-oil discovery during 1958 was in the Simonette River region of central-west Alberta, about 170 miles northwest of Edmonton. After four dry holes in this area, a prolific Woodbend Reef producing horizon was discovered at 11,405 ft, making it the deepest flowing well in Canada. The well flowed at a rate of 22 bbl per hour on a 13/64-in. choke, and shortly after the discovery a four-well follow-up program was begun. 1958 can also claim one of the most widely publicized wells in Canadian oil history—the Berland River discovery well—160 miles northwest of Edmonton. In addition to having the deepest productive horizon contacted in Canada (12,027 ft) and the thickest net gas pay sector (548 ft), Berland River has also been described as one of the world's most prolific gas wells, with an estimated open-flow potential of 1.5 billion cubic feet daily.

Refinery Operations: The crude-intake capacity of Canadian refineries increased by 7.7% from 778 to 838 mb/d during 1958. 30 mb/d was added in Ontario, and the remaining 20 mb/d in British Columbia—all in refineries designed to handle Canadian crude. Ontario has shown the greatest increase in refinery capacities in recent years. From 75 mb/d in 1950, Ontario refineries have grown to 236 mb/d at the end of 1958, accounting for 52.3% of all refinery additions in eastern Canada and 33.6% in all Canada. Over the same period, Ontario refineries increased their share of capacity in eastern Canada from 31.1% to 43.0%, and of all Canada from 20.9% to 28.2% (see Table VIII). With the Inter-provincial Pipe Line now completed as far east as the Toronto-Hamilton area, rapidly growing industrial development in this region should prompt further refinery expansion and increased requirements of domestic crude. In January 1957, Ontario refineries received 122 mb/d of Canadian crude and, two years later, 219 mb/d. Over the same period, runs of imported crude declined from 21 mb/d to about 5 mb/d.

The declining significance of imported crude oil in eastern Canada is illustrated in Table VIII. In 1950, crude imports accounted for 83.8% of refining capacity in eastern Canada, and the ratio had fallen to 53.0% by 1958. Imports from Venezuela and the Middle East showed substantial gains, while crudes from USA points declined from 86 to 4 mb/d. These USA imports were mostly run in Ontario refineries, which have since been connected to the Interprovincial Pipe Line system and now use Canadian crude.

Thus, total imports of foreign crudes by Ontario refiners declined from 69 mb/d in 1950 to 8 mb/d last year. Quebec and the Maritime Provinces, on the other hand—beyond the economic reach of domestic crude—increased imports to 283 mb/d from 133. But the principal growth in refining capacity has been in Ontario, and it would seem this emphasis will continue for some time.

Catalytic reforming capacity continued to gain during 1958, rising to 17.1% of crude-handling capacity, compared to 15.7% the year before and 0.8% as recently as 1953. Motor-gasoline octane levels advanced at a slower rate during the year, reaching an average 98.3 RON for premium and 92.2 RON for regular grades. At the same time, the ratio of premium to regular sales declined from 31.2% in 1957 to 26.8% in 1958, reflecting the increasing numbers of small imported vehicles, the incidence of local price wars which normally affect only regular-grade prices, and the general economy-mindedness of a recession period.

Product Demand: Demand for petroleum products during 1958, while not quite up to the record levels of the postwar decade, could nevertheless hardly be described as depressed or even recessional. Motor-gasoline sales increased by 4.1% in response to a 4.4% gain in motor-vehicle registration, mostly in passenger cars. Sales of all vehicles totaled 441,000, down 3.8% from 1957, while the 374,000 passenger cars sold were 2.1% less than the preceding year. Despite this modest decline in overall sales, demand for small imported cars increased by 55.0%, accounting for one in every five new cars sold. Table IX shows how sales of imported cars have more than doubled since 1956, rising to 20.5% from 8.4% of total

TABLE VI—WESTERN CANADA DISCOVERIES 1956-1958

	Oil			Gas			Total		
	1956	1957	1958	1956	1957	1958	1956	1957	1958
Alberta	53	51	38	49	37	40	102	88	78
Saskatchewan	59	34	30	1	4	3	60	38	33
Manitoba	2	4	—	—	—	—	3	4	—
British Columbia	—	11	2	7	4	12	7	15	14
Total	115	100	70	57	45	55	172	145	125

TABLE VII—CANADIAN REFINING CAPACITY[1]
(Thousands of barrels per calendar day)

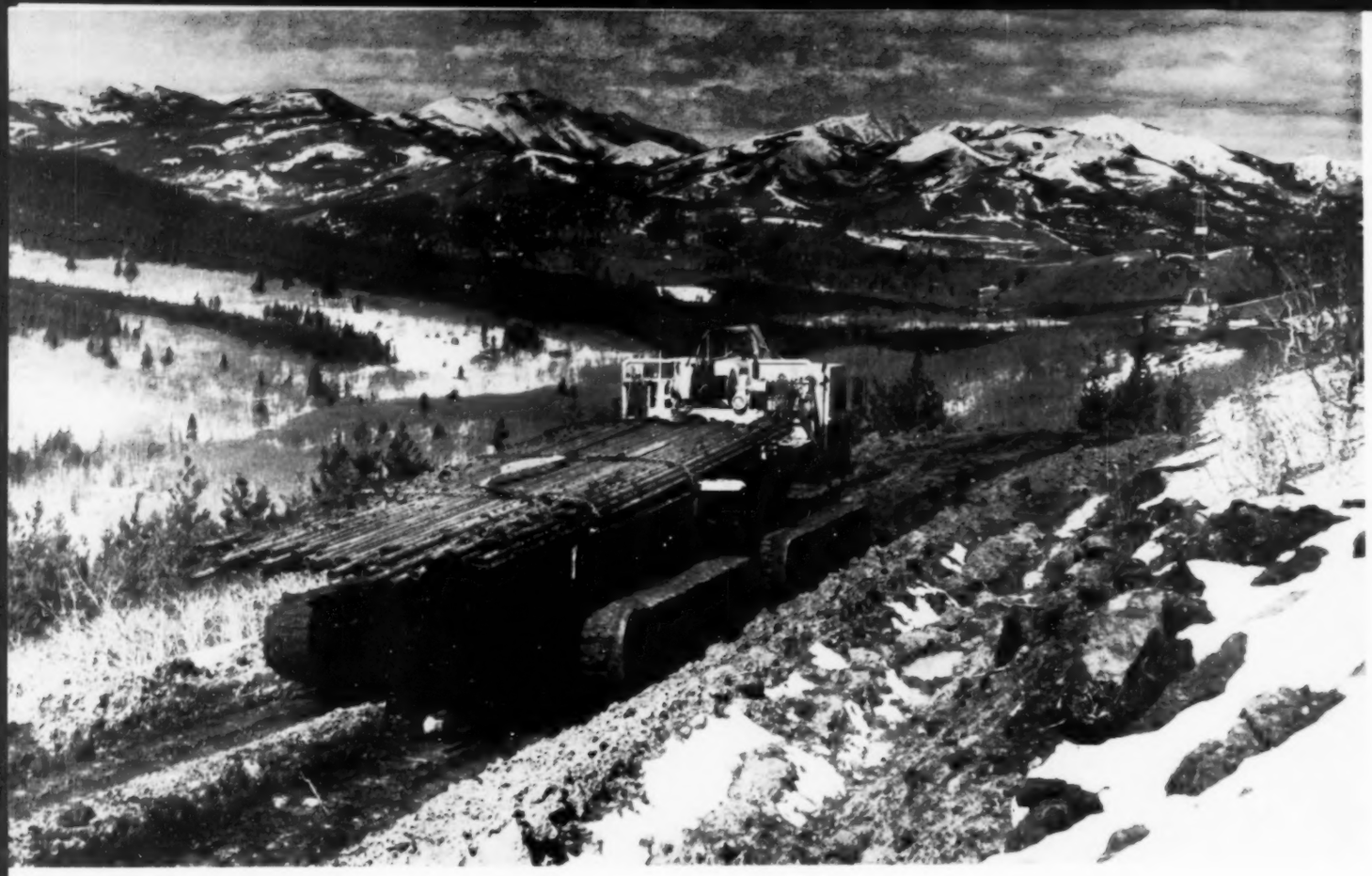
	Crude-Intake Capacity		Ontario as a Per Cent of Eastern	
Year	Ontario	Eastern[2] Canada	Canada	Canada
1950	75	241	359	31.1	20.9
1951	79	261	411	30.3	19.2
1952	105	288	448	36.5	23.4
1953	135	318	509	42.5	26.5
1954	142	350	565	40.6	25.1
1955	149	406	646	36.7	23.1
1956	160	449	710	35.6	22.5
1957	216	519	778	41.6	27.8
1958	236	549	838	43.0	29.2

[1] At year-end.
[2] Includes the Maritime Provinces, Quebec, and Ontario.

TABLE VIII—CRUDE-OIL IMPORTS INTO EASTERN CANADA
(Thousands of barrels per day)

	1950	1952	1954	1956	1958
Source of Imports					
Venezuela	83	140	165	212	199
Trinidad	7	4	8	11	5
Middle East	49	23	18	52	81
USA	86	56	25	17	4
Total	225	223	216	292	291
Destination					
Maritimes and Quebec	133	169	189	271	283
Ontario	69	32	20	20	8
Total Eastern Canada	202	201	209	291	291
Total Canada	225	223	216	292	291
Refining Capacity in Eastern Canada—MB/D[1]	241	288	350	449	549
Crude Imports into Eastern Canada as % of Refining Capacity	83.8	69.8	59.7	64.8	53.0

[1] At year-end.



A Nodwell transporter takes a load of drill pipe over the mud in Alberta. This is the latest and most successful of a long line of experimental vehicles for crossing the Muskeg, Canada's greatest barrier to warm weather oil operations in the north.

Right, Diamond-hard granite of the Precambrian Shield failed to halt the pipeliners as they moved through north-western Ontario on the section of the natural-gas line built under supervision of Trans-Canada Pipe Lines Ltd. for the Northern Ontario Pipe Line Crown Corp. Typical of the rock country was this stretch of line near Vermilion Bay. The granite first had to be blasted from the right-of-way to enable equipment to get through, and then the ditch had to be blasted mile after mile. The "quad-drill" makes four shot holes simultaneously, after which the holes are tamped with explosives and the rock blasted out of the 5-ft-deep ditch.

sales, and regaining the share of the market previously enjoyed in 1950. The effect of this and other factors on the ratio of premium to regular motor-gasoline sales has already been mentioned.

Demand for fuel oils was mixed. Middle-distillate demand—largely a function of residential, commercial, and industrial space heating—increased by 4.5%. Growing awareness of the competitive force of natural gas, particularly in eastern Canada, prompted greater selling effort on the part of fuel-oil salesmen, and the early arrival in December of a good old-fashioned Canadian winter contributed further to the gain. Heavy fuel oil, on the other hand—more directly dependent upon industrial activity—reflected the effects of the recent slowdown; and, despite the spurt in December, still recorded a 9.8% decline.

Aviation gasolines increased by 3.2%, suggesting a small fluctuation from the plateau of 10 mb/d which seems to have prevailed since 1955, rather than a growth trend. Aviation turbine fuels, on the other hand, increased by 17.2%, passing aviation-gasoline volume for the first time. While gasoline demand has remained at about the 10 mb/d level since 1955, turbine fuels increased in 1958 to 11,300 mb/d from 6,400 mb/d. Demand for all oils increased by 2.2%, from 737 mb/d in 1957 to 753 mb/d in 1958, the smallest gain in the postwar years.

Pipelines: In little over 10 years following the historic Leduc discovery, Canada has built the world's longest crude-oil pipeline and the world's longest natural-gas line. The far-flung geography of the country has required these bold measures to bring the new-found petroleum resources to the principal consuming markets in eastern canada. The 2,294-mile Trans-Canada Pipe Line system, through 11 distribution companies, now serves an area containing about 60% of Canada's population. By year-end, the line had been completed to Montreal and approximately 60 new towns and cities were being served. With construction just finished, the first looping program is already being contemplated for 1961.

In contrast to the decline in crude oil, natural-gas production increased by about 320 million cubic feet per day, or 53%, to 925 million cubic feet per day. Thus, natural-gas production was equivalent to 155 mb/d, or 34.0%, of crude production in 1958, compared with 101 mb/d, or 20.0%, in 1957. Behind this exceptional increase was the first full year of operation of the Westcoast Transmission Pipe Line, moving gas from the Peace River region to Vancouver and the Pacific Northwest states.

TABLE IX—SALES OF PASSENGER CARS IN CANADA—1950-1958
(Thousands)

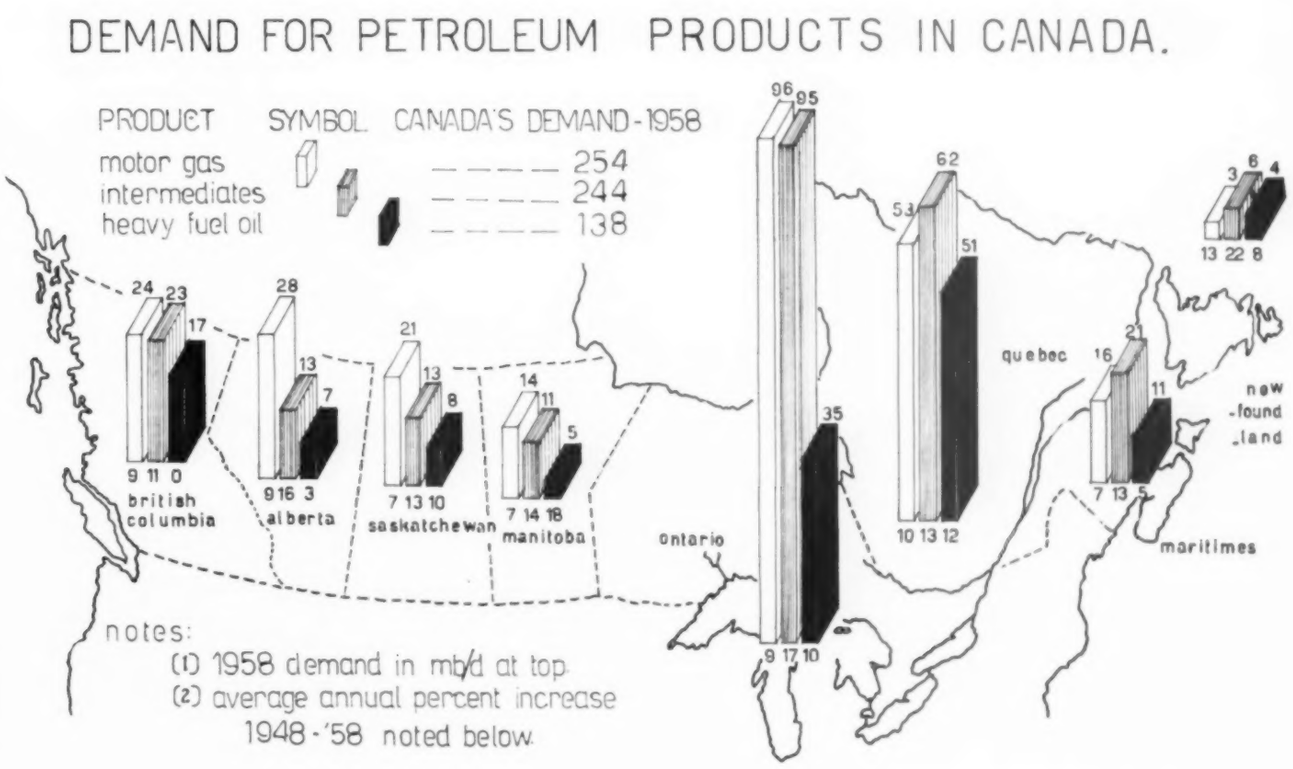
	Total	Foreign Models	Foreign Models as % of Total
1950	324.9	62.9	19.4
1951	275.7	29.1	10.6
1952	292.1	26.7	9.1
1953	359.2	26.4	7.3
1954	310.5	20.2	6.4
1955	387.0	22.2	5.7
1956	408.2	34.2	8.4
1957	382.0	49.4	12.9
1958	373.9	76.6	20.5

TABLE X—CANADIAN SUPPLY AND DEMAND FOR OIL—1956-1958
(Thousands of barrels per day)

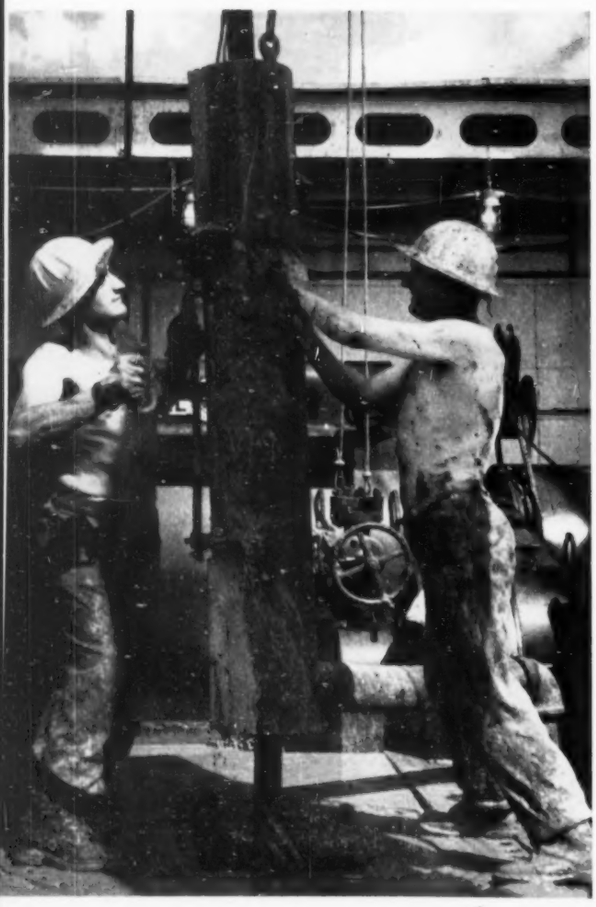
	1956	1957	1958[1]
Production			
Crude	469	499	455
Natural-Gas Liquids	13	13	13
Total Production	482	512	468
Imports			
Crude	293	307	288
Product	98	95	85
Total Imports	391	402	373
TOTAL NEW SUPPLY	873	914	841
Exports			
Crude	116	152	86
Product	6	9	2
Total Exports	122	161	88
Domestic Demand	721	737	753
Inventory Change	+30	+16	—

[1] Partly estimated.

Outlook: While demand for all petroleum products has increased by an average of 11% per annum since the war, a more conservative growth rate between 5% and 6%—is anticipated in the decade ahead. For 1959, a 7% increase in product demand is predicted, with crude production up 10%. Few Canadians doubt the sustained increase in petroleum requirements; the main uncertainty is rather the climate under which the industry will have to operate. The widely heralded achievements of the past 12 years were accomplished in an environment of minimum regulation and control. All the industry now asks is that this favorable atmosphere be retained so that the Canadian economy can be assured of least-cost petroleum energy from the most economic sources. END

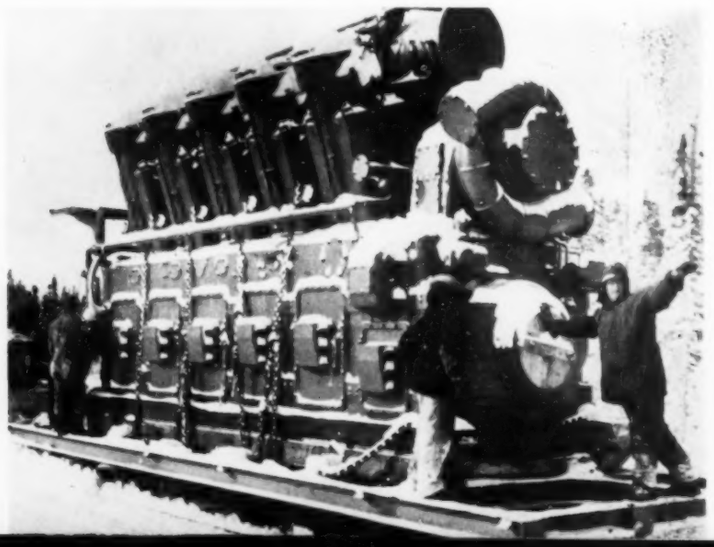


Above: Laying pipe on the Carbon-Calgary pipeline by Canadian Western Natural Gas Co., in September 1958 (Shell of Canada photo).



Left: Roughnecks pull pipe on world's largest gas well and Canada's deepest gas producer, 160 miles northwest of Edmonton, Alberta. The Berland River wildcat was brought in during 1958 by British American Oil Co. and Shell Oil on a jointly held reservation block (British-American photo).

Below: Eight-ton sled and its 100-ton load, one of three, 2,500-hp compressor engines, skidded across frozen muskeg on Trans-Canada natural-gas pipeline right-of-way near Geraldton, Ontario. Fabricated in Port Arthur, Ontario, by Trans-Canada personnel, the sled was made of channel iron I-beams and H-beams with $\frac{1}{4}$-in. steel plate covering the entire under side. 11-ft A-tongues, at front and rear, were used for pushing and pulling (Trans-Canada photo).



Natural gas—Canada's prodigal

by Floyd K. Beach

THE major reserves of natural gas in Canada are in the west, with Alberta having present proved reserves of 23.8 trillion cubic feet, northeast British Columbia 1.68 trillion, and Saskatchewan 1.16 trillion, according to estimates made by the Canadian Petroleum Assn.'s committee on reserves.

In eastern Canada, Ontario reserves have been estimated at 187 billion and, while small, their proximity to good markets make them valuable. New Brunswick had minor gas reserves which were used locally, but they are not now of enough importance to include.

Outlets—Westcoast Transmission: Westcoast Transmission constructed a pipeline from its plant at Taylor, B.C., to the United States border near Vancouver, delivering gas first in the fall of 1957. Throughput of this line in 1958 was 88,075,302 mcf, at pressure base of 14.73 psia and 60 F. Of this, deliveries to the United States were 76,933,899 mcf, sales in Canada were 10,275,867 mcf, and used in operations 865,536 mcf. Sales in Canada go to B.C. Electric in Vancouver and through lines of Inland Gas to various points in the interior of British Columbia. Sweet gas with little or no liquid fractions is gathered from the Peace River area of Alberta, and sour gas high in LPG is gathered from a number of fields in British Columbia within a radius of 25 or 30 miles from the Taylor plant. The plant is on the north side of Peace River, a very large stream lying in a deep valley, and a suspension bridge carries two gas lines, one bringing gathered gas to the plant and the other taking processed gas south to the market.

The consolidated statement of operations of Westcoast for 12 months ended September 30, 1958, showed a net loss of $5,136,794 after deducting $6,581,286 for depreciation and $506,135 for depletion. Thus cash flow from gas sales, byproducts sales, and miscellaneous revenue was more than enough to meet gas purchases, operating expenses, taxes, interest and exploratory costs during the first year of operation. The scrubbing plant for sour wet gas was not completed until November 1957, and it was mid-February 1958 before byproducts were produced for sale. First sale of gas was early in October 1957, averaging 95 mmcf per day in October to 280 mmcf per day in winter, with seasonal decline in summer.

Trans Canada Pipe Line: Trans Canada Pipe Line Co. completed its line from the Alberta border to Montreal early in the fall of 1958. Markets in eastern Canada have already proved much greater than early surveys had indicated. The initial authorization given by the Oil and Gas Conservation Board of Alberta was 4.35 trillion cubic feet to be taken over a 25-year period, and this was expected to be sufficient to deliver around 200 mmcf per day at Emerson, Manitoba, for use in the USA. There were delays by the Federal Power Commission in authorizing that import, and meantime contracts with distributors in eastern Canada used up the initial authorization. Trans Canada applied 1.1 trillion cubic feet and contracted with producers having reserves of that order. That increased authorization was granted by the Conservation Board; but, pending contracts with producers for purchase of more gas, the Federal Power Commission announced, October 31, 1958, that proposals by Midwestern Gas Transmission and its parent, Tennessee Gas Transmission, to import gas at Emerson were denied. FPC at the same time said new applications would be considered from Midwestern and from Northern Natural Gas "so that Canadian and American sources would be interconnected from the Gulf to Canada across the breadth of the United States." From all we can see and read between the lines, it appears that the major obstacle to export of gas at Emerson lies in lack of contracts to purchase gas from Alberta producers.

Throughput in Trans Canada reached a maximum day in December of 261,843 mcf, with December average about 238,000 mcf per day.

Trans Canada construction for 1959 is expected to be $13,500,000. This is in addition to $245 million already spent by Trans Canada and $113.5 million by Northern Ontario Pipe Line Crown Corp. Four compressor stations are to be built at a cost of $13 million and 15 sales meter stations costing $500,000. Six compressor stations will be near Ignace, Geraldton, and Hearst. They will have design and engineering under supervision of Trans Canada. The fourth compressor station will be near Maple, 20 miles north of Toronto. The line, 2,290 miles long, is patrolled at least once a week from the air by specially trained pilots and regularly by maintenance men on foot.

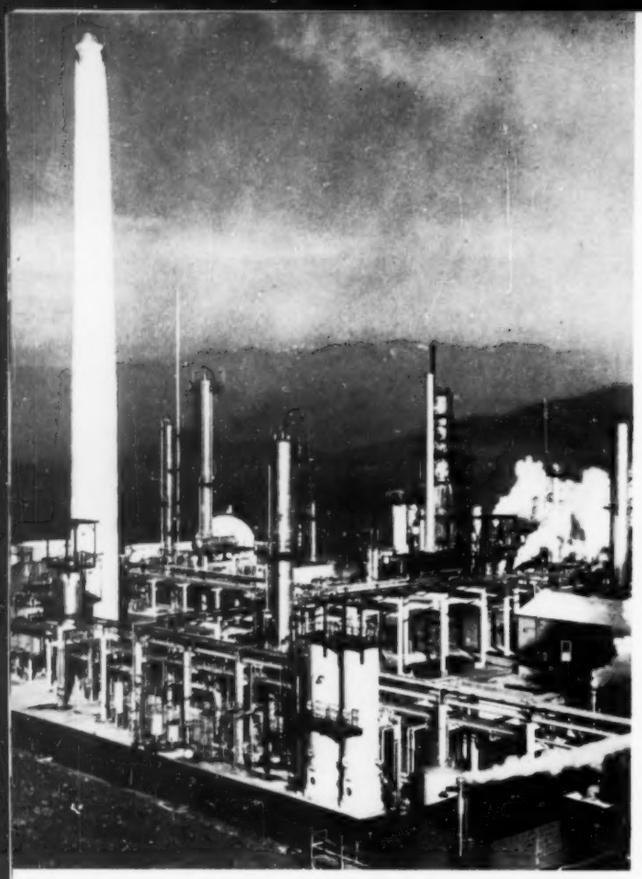
Gas for Trans Canada is transported by the Alberta Gas Trunk Line, an Alberta corporation acting only as transporters. Producers meter their gas into Alberta Gas Trunk Line after preparing it for market to specifications demanded by Trans Canada, and Trans Canada checks the meter charts, paying each producer for his deliveries. Alberta Gas Trunk Line is picking up gas from the fields shown as solid lines on the map (Fig. 1), and proposed 1959 and 1960 construction is also shown on the map. When Trunk Line was organized, stock was put on the market with limitations as to the amount each person could purchase, and the stock has appreciated materially. Bonds were also sold in 1958, but it has been announced that borrowing for 1959 construction will be made through banks.

Export to Montana: Limited export to Montana continues from fields in southeastern Alberta owned by Canadian Montana.

Alberta Outlets: Canadian Western Natural Gas Co. supplies Calgary, Lethbridge, and intermediate points as well as Banff and Exshaw. Canadian Western also supplies towns north of Calgary up to but not including Red Deer, the gas coming from British American plant at Nevis, where casinghead gas is processed. The transmission line connects at Red Deer with a pipeline of Northwestern Utilities so that either line can supply the other in emergencies. Northwestern Utilities supplies Edmonton

(*Continued on page 88*)

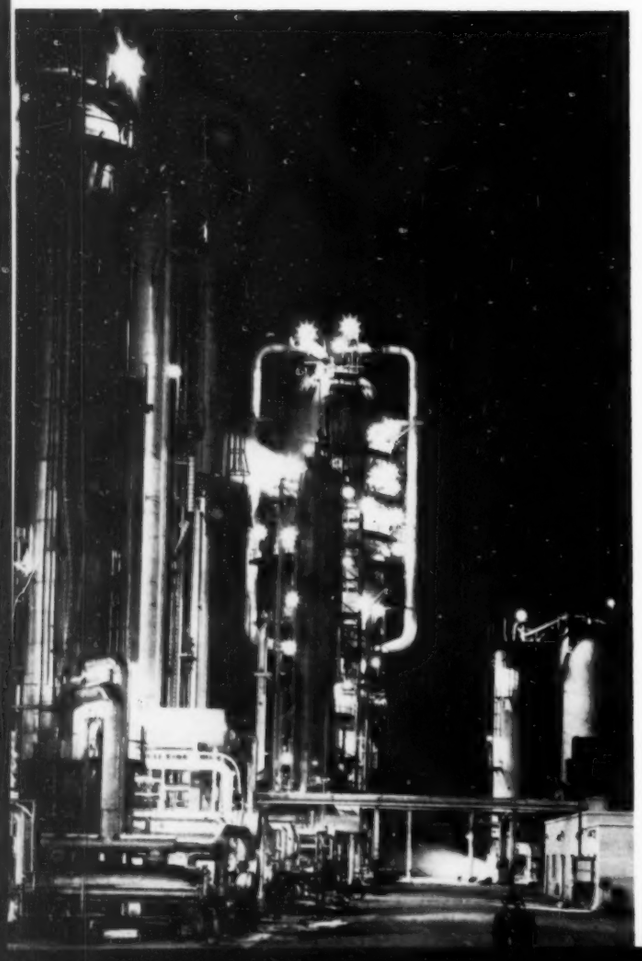
Individual 40-ft section of pipe welded into continuous steel artery on Trans-Canada natural gas line now carrying Alberta gas to Montreal.



200-ft stack of the new $2 million distillate hydrodesulfurizer for output of high-quality diesel, heating, and aircraft fuels at Shell Oil Co. of Canada's Vancouver refinery: Process design is to reduce sulfur content of distillate oils through use of hydrogen.

Major Canadian refining additions under way

Canadian crude capacity rose 48,000 barrels in 1958. Important expansion and revamp projects are near completion, and two major refineries are scheduled for 1960 operations.



British American's Clarkson refinery near Toronto, where catalytic cracking capacity is to be increased soon, along with other new facilities.

Two major refineries were completed and one plant greatly enlarged in Canada during 1958, bringing national capacity to 810,000 bbl per calendar day. This compares with a domestic demand for petroleum products in 1958 of about 768,000 b d. Since some specialty refined products must be brought in, notably distillate fuels, Canadian capacity appears for the first time to be somewhat ahead of domestic demand. This would not have been true, however, had consumption maintained the rate of increase which Canadians were viewing as normal before the recent recession. Increases of 3% in 1958 and 5% in 1957 compared with 11% and 14% in the boom years of 1956 and 1955.

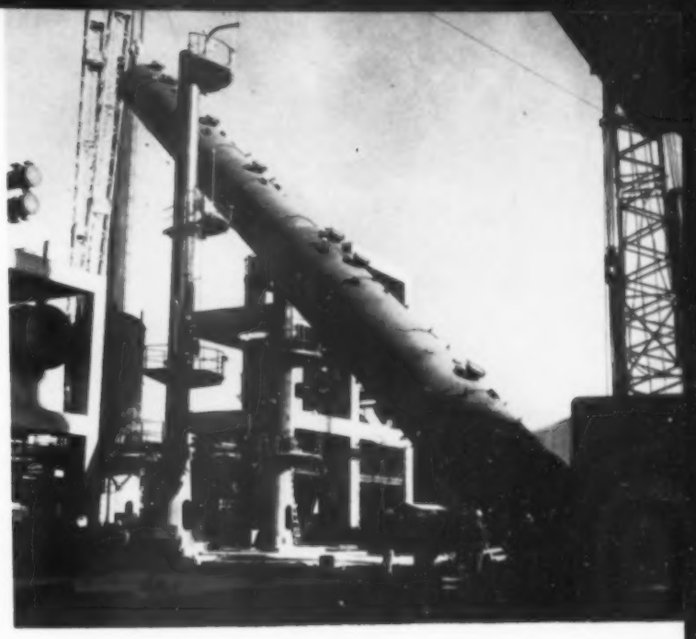
Demand now has turned upward again in Canada. Assuming an increase of about 6% this year to 810,000 b d, the balance of refining capacity and domestic requirements will not be badly out of line, since new crude-processing facilities scheduled for completion this year are not so great as the anticipated rise in consumption. Largest increment to capacity will be at the Sarnia refinery of Canadian Oil Companies Ltd., which is completing a 20,000-bbl crude project, bringing throughput capacity to 50,000 b d. In this same area, Imperial Oil Ltd. will increase capacity of its Sarnia plant by 17,500 b d before the end of the year. This is being done through bottleneck removal by the company engineering staff. These two projects will add 37,500 b d to Ontario capacity this year, continuing a recent trend toward concentrating capacity in an area which can be economically supplied with prairie crude.

Imperial Oil Ltd.'s Calgary Expansion: Imperial Oil Ltd. is expanding its refining facilities at Calgary, Alberta, to include the following new additional process units:

	Barrels Per Stream Day
Atmospheric and vacuum-distillation unit	16,000
Fluid catalytic cracker, fractionation, and light ends	7,250
Powerformer	3,000
Treating facilities for naphtha and middle distillates	
CO-boiler and water-treating facilities	
Waste-disposal facilities	

At present, Calgary refinery consists of an 8,600 b sd combination unit; a 645 b sd H_2SO_4 alkylation unit; and bauxite, straight-lye, and doctor-treating facilities, along with an asphalt plant. Only the alkylation and asphalt units will remain in operation upon completion of the new process units.

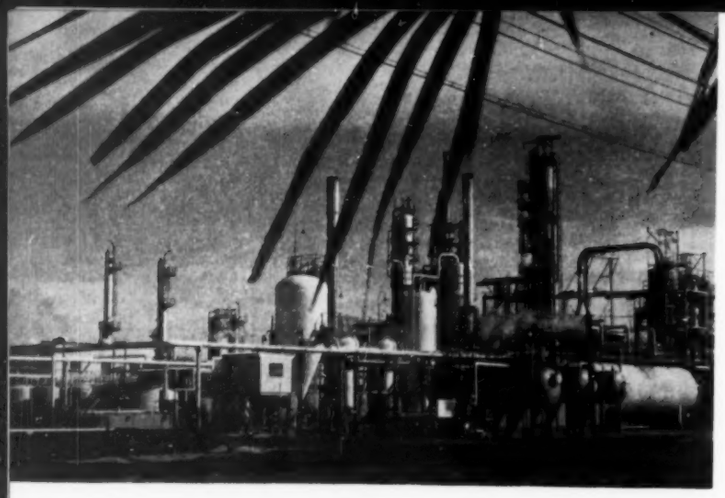
Process design for the new units was by Imperial Oil Ltd. engineering division, with mechanical design and construction by Canadian Bechtel Ltd. The construction contract was awarded in November 1957, at which time construction engineering was initiated. Completion date was scheduled for August 31, 1959, but has since been advanced to July 1, 1959. Field construction



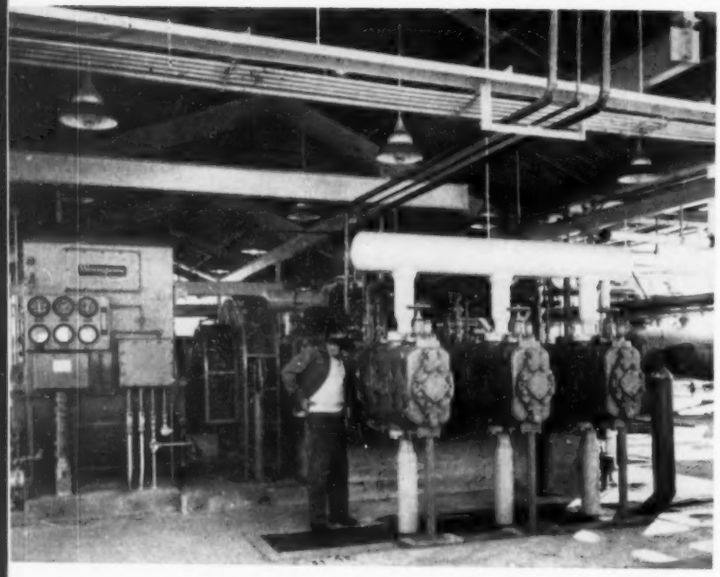
Putting 123-ft 48-ton fractionating tower in place at Imperial Oil's Calgary refinery. Job took seven hours to place the tower between two other smaller towers with a clearance of only 6 in.

Artist's drawing of units in Imperial Oil Ltd.'s program for expansion of its refinery at Calgary, scheduled for completion July 1959. Engineers and constructors are Canadian Bechtel Ltd.

Night view of B-A Port Moody refinery: Alkylation unit is in foreground; catalytic cracker at right. Unit is first for B-A, and first to be installed in British Columbia.



View from office window at Imperial Oil's Regina refinery.



New 3000-hp hydrogen compressor at motor-fuel Platformer at Canadian Oil Companies' Sarnia refinery.

began April 1, 1958; and, on February 1, 1959, was estimated as being 74% complete. The total project cost is estimated at approximately $16 million.

In addition to the new process units being constructed, considerable offsite activity is under way. This includes a new laboratory of 9,000 sq ft replacing the original laboratory installation, a new storehouse of 9,368 sq ft, renovations to the mechanical shops, minor alterations to the administration building, renovations to tank-car loading facilities, improved gasoline-blending facilities, a decentralized oil-movement transfer system, piping changes associated with changes in tank duties, improved blending and loading facilities.

By completely reorganizing all existing tankage and transfer piping, it was only necessary to construct one new tank. All changes in tank service, tank cleaning, and piping changes had to be carried out without disrupting the operation of the existing process units. The accomplishment of this swingover without incident was a credit to the organization and planning of refining and construction personnel.

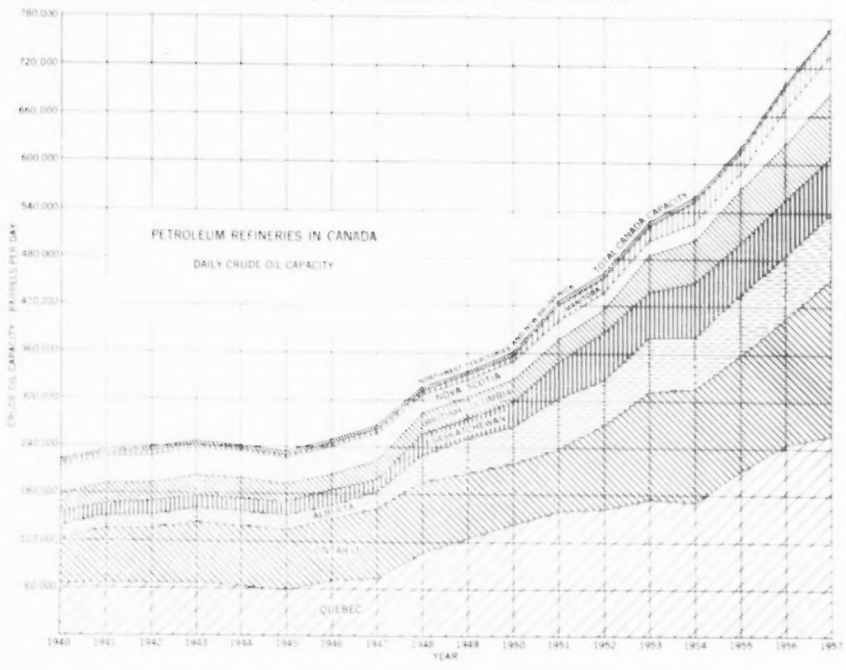
Construction progress on the project has been excellent. This has stemmed from a combination of factors—excellent weather, high productivity of labor, material availability, and organization. To February 1959, only 1½ days had been lost due to inclement weather, a remarkable statistic over such a prolonged interval in such an extreme climate.

An intensive effort was made by Imperial Oil Ltd.'s process and mechanical design personnel to reduce the cost of the installation. Process flow plans were thoroughly reviewed to take advantage of all items of cost reduction and still maintain a safe, operable unit. From a mechanical design point of view, the principal item of cost reduction was the elimination of pumphouses. In view of Calgary's severe winter, where temperatures of −30 F are common, the departure from pumphouses may seem drastic. However, operating experience and safety indicate the design will be quite practical. In addition, the usual gland-oil system was eliminated, and gland oil is provided only to critical pumps. The gland oil provided is from intermediate or product streams in the process unit.

Calgary refinery marks a milepost with respect to instrumentation for a major installation within Imperial Oil Ltd. The bulk of the instrumentation control is electronic, and valve actuation is electropneumatic. It is felt that instrument maintenance associated with conventional pneumatic systems at low temperatures will be reduced, and prompt replacement of malfunctioning electronic controllers by spare pullout units will provide for more continuous instrument operation.

The atmospheric and vacuum unit has been designed to process 16,000 b/sd of Alberta crude ranging in gravity from 17 API to 38 API, including a percentage of field condensate. The bulk of the crude supply is obtained by pipeline from the

Sources: Mineral Resources Division, Department of Mines and Technical Surveys.



Sundre-Westward Ho region of Alberta.

The unit consists of electrical desalting facilities, a preflash tower, an atmospheric tower, and a vacuum tower. The integrated operation produces a naphtha stream for motor-gasoline blending, a Powerformer feed stream, heavy naphtha, diesel base, cat-feed, and fluxed pitch or asphalt.

The fluid catalytic cracking unit is an Esso Research and Engineering Co. model IV, designed for a feed throughput of 7,250 b/sd. Operating pressure was increased to reduce vessel sizes, and also to accommodate production of a 250 FBP naphtha fraction from the top of the main fractionator, thereby eliminating the necessity of a naphtha splitter.

The light-ends facilities consist of an absorber, debutanizer, and depropanizer designed to produce a debutanized naphtha and a C_4 stream for alkylation-plant feed stock.

The Powerformer is designed to process 3,000 b/sd of feed, and includes a Hydrofiner, catalytic reformer of Esso Research and Engineering Co. design, and product debutanizer.

The refinery treating facilities can be summarized as follows:

	Barrels Per Stream Day
Natural naphtha copper-chloride treater	3,700
Light catalytic naphtha treater	2,630
Heavy catalytic naphtha treater	1,556
Light cracked gas-oil treater	884

The natural naphtha treater is a copper-chloride slurry-type treater, and will process natural naphthas on a blocked operation. Naphthas to be treated are motor gasoline, aviation base, and jet fuel. Cracked streams are treated in coalescers, and receive a caustic wash followed by a water wash.

The new plant is amply provided with water-pollution abatement equipment. There are separate facilities for incinerating phenolic water and caustic solution. Sulfide-bearing waters and brine from the desalting operations will be flue-gas- and steam-stripped, and the resultant stripped vapors will be incinerated. Solid wastes and oil emulsions will be handled in a gravity settling tank, and the sludge residue will be transported to Edmonton refinery for complete incineration.

The new sewer system contains separate oily-water and clean-water sewer facilities which discharge to a revamped rectangular separator. The water-retention time in the oily bay is approximately 51.5 min, and in the clean-water bay is approximately 41.2 min. The separator effluent has been designed to conform with the requirements laid down by the Department of Health for Alberta with respect to water quality in the Bow River.

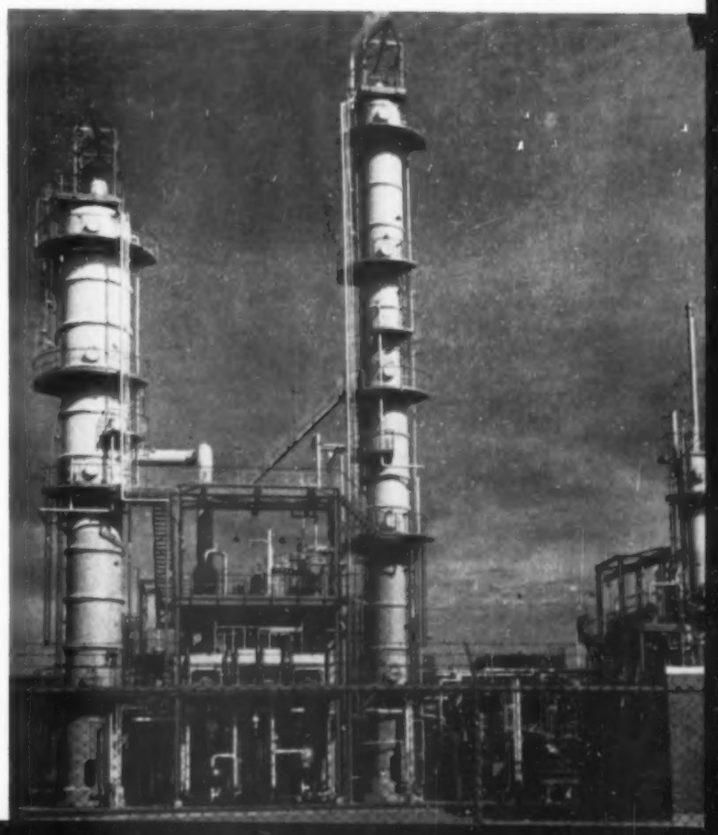
A CO boiler generating 80,000 lb per hour of 600 psig steam has been constructed to supplement Calgary's 110,000-lb-per-hour 150-psig steam-generating capacity. It was necessary to provide new raw-

C. V. Rollinson, London project manager for BP's new Canadian refinery near Montreal.

T. G. McLintock, vice president and general manager of BP Canada Ltd.

H. L. Ray, manager in London of Commonwealth Division, BP's refinery and technical department, and responsible for overall supervision of building of the Montreal refinery.

Naphtha specialties plant at Imperial Oil's Sarnia refinery.



water feed pumps and install a completely new hot-lime zeolite boiler-feed water-treating system. Three existing boilers had to be demolished to make room for the feed water-treating equipment. The removal and construction had to be accomplished without disrupting the existing refinery steam supply, and had to be completed before December, 1958.

A refinery expansion program in northern British Columbia began in March 1959 by Pacific Petroleums Ltd. for increased utilization of natural-gas liquids at its McMahon gas plant, enlargement of its Taylor, B.C., refinery, and additional work at its Dawson Creek refinery. Phillips Petroleum Co. will operate the refineries and marketing of products in the Peace River area.

With completion of the program this year, Pacific Petroleums will produce a full range of products sufficient to supply the oil needs of the entire northern area, according to George L. McMahon, Pacific Petroleums president. Products are marketed by Phillips and Pacific through 50 retail and bulk outlets located in central B.C., the Peace River area, the Yukon, and Northwest Territories. The Dawson Creek refinery also produces asphalt for a large road-paving program now under way in the area, including the Alaska highway.

Eastern Canada: Two major refineries will come onstream in eastern Canada in 1960. These are the British Petroleum Co. plant at Montreal and the Irving Oil Co. refinery at St. John, New Brunswick. The BP plant is to have a capacity of 25,000 b d, and the Irving plant 40,000 b d.

BP Canada Ltd. announced the acquisition in 1957 of a 600-acre site near Montreal on which to build a refinery to process crude oil and manufacture high-grade petroleum products to be sold on the Canadian market under the BP trademark. These plans represented the first venture of The British Petroleum group into marketing and refining in North America.

In the past two years these plans have progressed considerably. Already the company has built or purchased more than 400 service stations, the majority in Quebec province and, recently, several in Ontario.

Concurrent with this expansion, plans for the refinery have been finalized and work started on the Montreal site. The refinery is situated in Ville d'Anjou, adjacent to existing refineries at the eastern end of Montreal Island, and approximately three miles from the St. Lawrence River. It will process 25,000 b d initially, but will be laid out in such a way as to permit future expansion to double that of the original capacity.

The refinery is being designed, engineered, and constructed by The Lummus Co. Canada Ltd. to produce primarily motor fuel, kerosine, gas oil, diesel oil, and fuel oil. Ground-breaking ceremony on May 12, 1958, marked the official start of work.

Erection of tankage was undertaken as soon as the site was made ready. This was followed by work on the cleaning, priming, coating, and wrapping of 24 miles of pipe which links the refinery with an oil dock on the St. Lawrence River. The site now is busy with preparation of process-unit footings and erection of steel.

About 200 acres of the 600-acre site will be occupied by the refinery units and tankage. The main process plant will be a 25,000 b d distillation unit with an atmospheric and vacuum section. This unit, as well as all other parts of the plant, is being built to process sour crude so that 100% Middle East oil can be run.

A distillate-treating unit with a charge of 12,000 b d will process some of the lighter fractions and some kerosine from the distillation unit, desulfurizing and splitting them into components. A light gasoline fraction will be taken off for motor-fuel blending; the middle cuts will go to a UOP Platformer for further processing, and the lower cuts to kerosine storage.

In the 6,000 b d Platformer, the middle cuts from the distillate treatment will be converted to high-grade motor-fuel blending stock. The waxy distillate and heavy gas oils will be fed to a 9,000 b d UOP fluid catalytic cracking unit with which will be associated a catalytic polymerization unit and minor treating units.

Some of the kerosine and gas-oil fractions from the distillation unit will be blended for diesel and No. 2 furnace oil, while the residue will go to form No. 6 fuel oil.

Storage tanks for crude oil and products will range in size up to 160 ft in diameter. Each of these biggest tanks will be capable of holding 172,000 bbl of crude oil.

Near the main gates of the refinery will be an administration building housing a laboratory, a canteen, and offices, while nearby will be a workshop and stores building.

Steam for the refinery units will be produced from high-pressure boilers. Electricity will be purchased. Cooling water will be piped from the St. Lawrence River to feed a cooling-tower system within the refinery.

Tankers carrying crude oil for the refinery will berth at a new 780-ft dock being built by the National Harbors Board on the St. Lawrence River. Tankers of up to 28,000 dwt will be able to berth alongside the dock, which will be able to accommodate one large sea-going or two small river tankers at one time. From the dock, a three-mile buried pipeline will carry the crude oil to the refinery. Crude oil also will be drawn from the pipeline connecting Portland, Me., with Montreal.

Some of the refinery's products will be distributed by river, and a number of product lines will connect the refinery with the dock. The refinery will probably tie in with the Trans-Northern pipeline carrying products from Montreal to Kingston, Ottawa, and other towns west of Montreal. Both rail and road loading areas will be built within the refinery. A spur line from the nearby Canadian National Railways main line has been laid into the refinery. Truck transports will be able to use an express highway which is to be built along one of the refinery's boundaries.

During the building of the refinery, a number of BP engineers and specialists, all of whom have been connected with the construction of other new BP refineries, will oversee the project either from London or Montreal.

H. L. Ray, Manager of the Commonwealth Division of BP's refinery and technical department, London, is responsible for the overall supervision of the building of the Montreal refinery. Mr. Ray was project manager in London for the building of BP's Aden refinery.

C. V. Rollinson, project manager, has his headquarters in London. He was responsible, in London, for much of the engineering work on BP's refinery at Kwinana, Western Australia, and spent two years at the refinery before and after it had been commissioned.

J. Lees is project engineer, with headquarters in London. In recent years he has been engaged in engineering work in connection with the building of BP's Kent refinery and British Hydrocarbon Chemical Co.'s plant at Grangemouth.

BP's construction manager in Montreal is C. H. E. Rebbeck, who occupied the same position during the building of Kwinana refinery. Prior to that Mr. Rebbeck was in charge of the expansion of BP's Grangemouth refinery. With Mr. Rebbeck in Montreal as project engineer is V. J. Morgan, who was previously engaged in engineering work connected with BP's Aden and Kent refineries.

The second major project, as previously mentioned, is the $50 million plant to be

(Continued on page 82)

Construction site of BP of Canada's new refinery at Montreal East.

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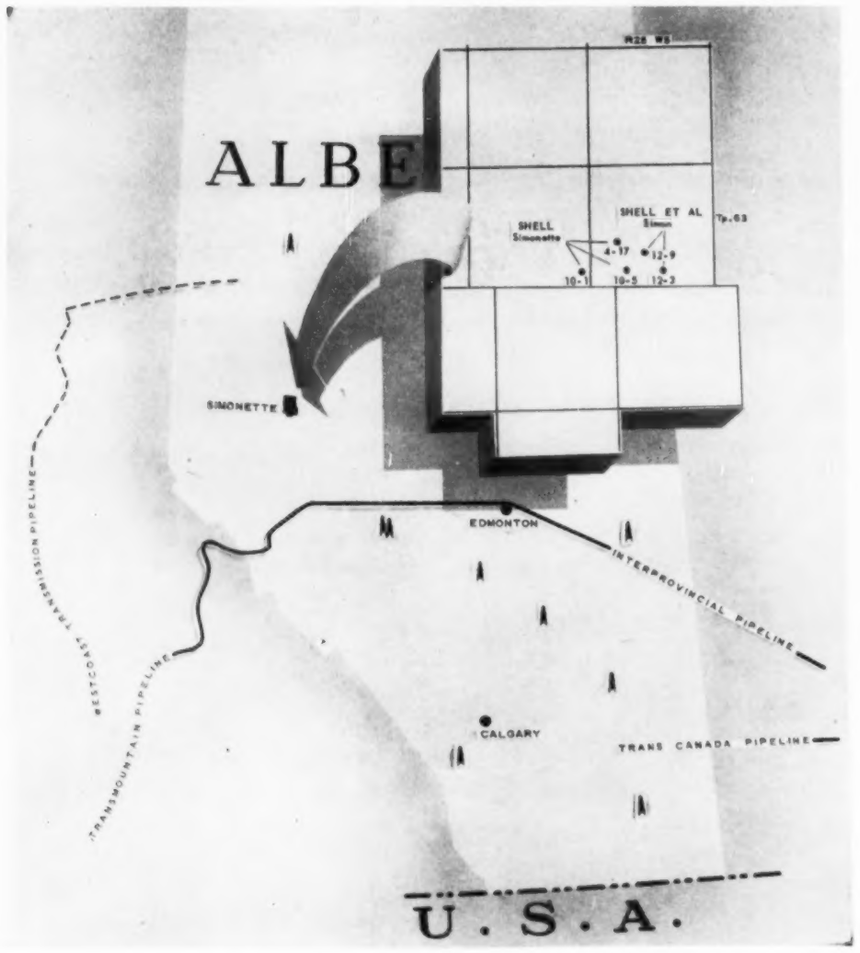
Canada's exploration—1958

by C. A. S. Bulmer
J. C. Sproule & Associates, Calgary

A major land play moved the oil hunt about as far north as it can go. Exploratory results during the past year were best in Alberta and northeastern British Columbia in sediments of Devonian, Mississippian, and Triassic age. Gas production rose, but oil production declined to meet market proration in Alberta.



General Exploration and Development Activity: During 1958, a total of 2,433[1] exploratory and development wells were completed in western Canada, a decrease of 568, or 19%, from 1957. Alberta accounted for 60% of the total number of wells drilled, Saskatchewan 32%, Manitoba 4%, northeastern British Columbia 3%, and the Northwest Territories and Yukon Territory less than 1%.

The total number of exploratory wells showed a decrease of 19.6% (1,058 to 848) during 1958 as compared to 1957. Included in the exploratory class are new-field wildcats, new-pool wildcats, deep-pool tests, shallow-pool tests, and outposts. All areas except the Northwest Territories and Yukon Territory, representing only a small part of the total, show a decrease in exploratory drilling.

(1) Total does not include service wells.

Oil condensate and/or natural gas were discovered in 200 exploratory wells in western Canada in 1958, giving a success rate of 23.5%, compared with 28.7% recorded in 1957. Development drilling in western Canada showed a decline of 18% in 1958 under 1957. Alberta was the only province to show an increase, with Manitoba and Saskatchewan showing substantial declines.

A comparison of the number of drilling rigs operating in 1957 and 1958 reflects the general decrease in activity during the past year in western Canada. The number of rigs engaged in exploratory and development drilling decreased from 242 at year-end in 1957 to only 169 in mid-year 1958; but, by December, 211 were busy. Drilling activity should rise to a peak in the winter season when heavy equipment can be moved in the

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Veronica doesn't know that most of her beauty aids, perfumes, some of her lovely clothes are by-products of petrochemicals. We don't need to tell her. And there is no need for us to remind you that Dominion Securities is frequently called upon to raise funds for further research and development in all phases of oil company operation. If we can be of service to you, please contact us.

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northern muskeg areas. Budget cuts caused a decrease in the northern muskeg areas. Budget cuts caused a decrease in the number of geophysical crews engaged in oil and gas exploration in 1958.

Western Canada's oil production dipped slightly below the all-time high record in 1957, ending an unbroken 11-year period of increasing production. Production restrictions were responsible for the decrease, as the export market for western Canada oil dropped by over 40%. Loss of the Puget Sound market to offshore foreign crude accounted for the majority of the loss. Alberta was the hardest hit by restrictions, as oil wells produced only 33% of their maximum permissive rate in early spring, but increased to 46% by year-end. Saskatchewan, British Columbia, and the Northwest Territories showed slight increases in oil production, and Manitoba reported a minor decrease.

Production of gas in western Canada increased considerably in 1958 with the completion of the Trans-Canada Pipeline and first delivery of Alberta gas to markets in Ontario and Quebec late in the year.

Recommendations of the Borden Royal Commission on Energy, set up by the Canadian government in 1957, will probably have an effect on western Canada's oil and gas production in 1959. The commission's first report, issued last September, concluded that reserves of gas in western Canada far exceed Canada's foreseeable needs, and that gas export would be justified. Other important decisions to be made in 1959 which will affect production include: the policy of the Canadian government towards increasing gas and oil markets after hearing the recommendations of the Borden commission; a decision of the Alberta government on gas export; the policy of the USA government on oil imports; and the attitude of certain eastern Canadian and USA Puget Sound and Midwest refiners towards the source of oil supply.

Pipeline construction in 1958 included the completion of the Trans-Canada Pipeline from Alberta to Montreal, a distance of 2,294 miles, and the extension of the Alberta Gas Trunk Line system. A 124-mile crude-oil line was completed by Federated Pipe Line, tying in the new oil-producing area of Swan Hills to Edmonton. The Interprovincial Pipe Line from Edmonton to the Great Lakes increased capacity by looping. Proposed new projects which may begin in 1959 include a crude-oil pipeline from Edmonton to Montreal, a crude-oil line from northeastern British Columbia to the Pacific Coast, and new gas-export lines to the United States proposed by the Westcoast and the Alberta and Southern companies. Pipeline construction will be affected by USA and Canadian government policies as to export and import, and also by the development of newly discovered reserves.

The biggest land play during the past year reached its peak in April and May, involving some 41 million acres stretching from the southern boundary of the Northwest Territories to the arctic coast and west to the boundary between the Yukon Territory and Alaska. The first step in the exploration programs, consisting of work by surface geological parties, got under way during the summer.

Northeastern British Columbia: There were 48 exploratory completions recorded in British Columbia in 1958, compared wtih the previous year's total of 61. Four exploratory wells were completed as successful oil wells and six others as successful gas wells, giving a success rate of approximately 21%, a substantial decrease from the 1957 figure of 49%.

Development drilling accounted for seven successful oil wells and nine potential gas wells during 1958. The oil wells were restricted to the Boundary Lake and newly discovered Milligan Creek fields, whereas the gas development wells were split among 11 fields.

Drilling activity was confined to the northeastern portion of the province, except for several unsuccessful tests drilled on the Queen Charlotte Islands, and a single exploratory failure completed on Saturna Island.

Two important Triassic "D" oil discoveries, Beatton River and Milligan Creek, located about 80 miles north of Fort St. John field, highlighted the past year in British Columbia. The two areas are only six miles apart, and may prove to be the same reservoir. The Milligan oil accumulation was discovered by Hudson's Bay Milligan Creek No. 1 well (location 94-H-2-G-73), completed in Januray 1958. The Beatton River discovery well was Triad Beatton River No. 1 (location 94-H-2-G-73). The first discovery in the area was made during 1957 by the Richfield-Decalta Big Arrow Creek well which discovered gas in the Triassic "D" zone. This well is located about eight miles west and updip from the oil accumulations.

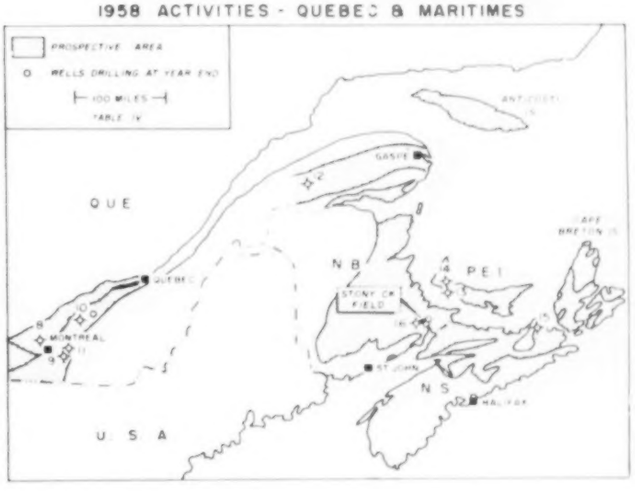
A large gas discovery was made 100 miles northwest of Fort St. John by Dome-Basco Laprise Creek No. 1 well. The discovery was reported to have a net pay section of 110 ft in the Triassic. Flow rates on restricted production reached 9 mmcf per day, and the well was completed with a potential of 25 mmcf per day. Twenty miles south of Fort Nelson, two wells, Pacific Ft. Nelson No. 1 (location 94-J-10-B-96) and Gulf States-Imperial Clark Lake No. 1-A (location 94-J-9-L-88), discovered gas in the Mississippian. Previous wells in the area, Gulf States Prophet River No. 1 and Shell-Gulf Klua Creek, had encountered gas in the Devonian Slave Point formation. Exploration should continue to move northward during 1959 as Westcoast Transmission strives to meet the increasing demand for natural gas.

Alberta: In Alberta a total of 518 exploratory wells was completed during 1958, a drop of 9% from 1957. These wells include 58 indicated oil wells and 84 potential gas wells, giving an all-over success rate of 27%, a decrease from the rate of 35% established in 1957.

In respect to development drilling, Alberta recorded 950 completions during 1958,

1958 EXPLORATORY AND DEVELOPMENT ACTIVITIES IN EASTERN CANADA

1958 ACTIVITIES - QUEBEC & MARITIMES



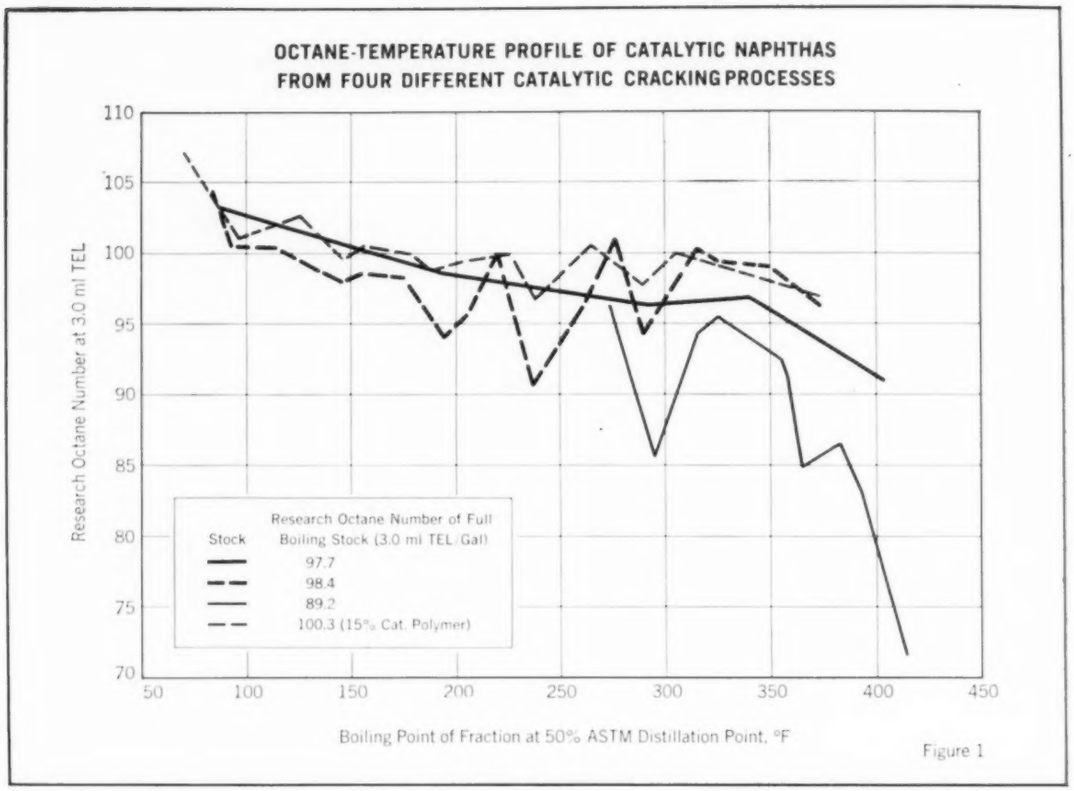


Figure 1

Octane profiles show how to use high-octane gasoline components more effectively

By D. D. Hornbeck, Refinery Technologist

IN RECENT YEARS, refiners have shown interest in separating high (and low) octane hydrocarbons of gasoline blend stocks. Fractional analysis has been u ed to separate, for distribution studies, such stocks as cracked gasoline, reformed gasoline, reformer charge stock and, in some cases, finished gasoline.

A report of several "octane profile" studies conducted in Ethyl's Detroit Laboratories is now available.

How "Octane Profiles" Are Drawn

A sample is carefully fractionated into narrow cuts of 5 to 10 percent of the total fuel. Laboratory octanes, and other pertinent data such as hydrocarbon type are obtained on each fraction. A plot of the distribution of antiknock quality throughout the boiling range of the gasoline is then drawn. This plot is referred to as an "octane profile."

Fractional Analysis For Octane Improvement Studies

In a refinery where tetraethyllead is near the allowable maximum, splitting an existing process stream and blending the higher octane fraction to a given gasoline grade may be an effective approach to octane improvement.

This technique doesn't increase the antiknock quality of the gasoline pool. But frequently it permits the refiner to meet higher octane specifications for a given grade of gasoline.

And higher octanes generally are possible with lower investment and operating costs than by other process methods.

The "octane profiles" of four catalytically cracked gasolines from different refining processes are compared in Figure 1. It will be noted that distribution of high and low-octane hydrocarbons throughout the boiling range of the stock follows a general pattern.

Each stream can be split to yield a portion that is higher in antiknock quality than the full-boiling material. This is true of almost all cracked gasolines even though large differences in octane quality exist at various points in the boiling range.

With the cracked gasolines shown, 30 to 50 percent of the light fraction is from 2 to 4 Research octane numbers higher than the full-boiling material.

Figure 2 compares "octane profiles" of four gasolines from different catalytic reforming processes. In this case the heavy fractions will yield a 20 to 40 percent cut that is 2 to 6 RON higher than the full-boiling material.

Fractional Analysis For Examination of Charge Stock

Figure 3 shows "octane profiles" of two

catalytic-reformer charge stocks. The straight run naphtha contains a front-end cut that is already satisfactory blending stock for regular gasoline. Further, the hydrocarbon-type composition showed no naphthenes in this fraction and, therefore, its value as part of reformer feed is questionable.

Similarly, the pressure distillate shown in the same figure contains high-octane light olefins according to hydrocarbon-type analysis and "octane profile." This cut could very well be blended directly to motor fuel since, as part of the reformer charge stock, the high-octane olefins would be saturated.

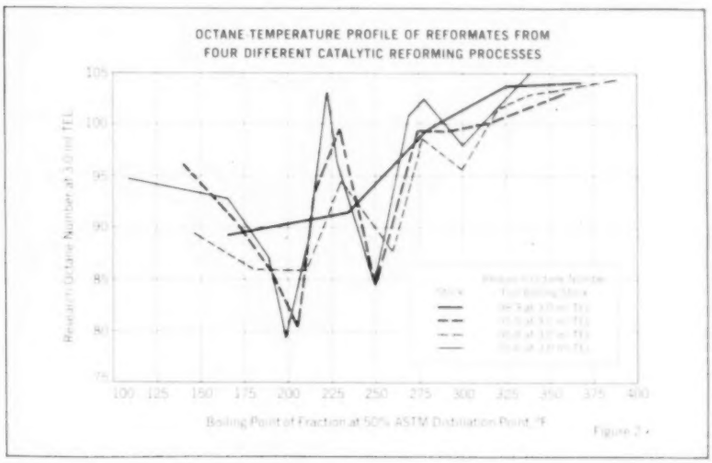
Finding the Cause of Knocking Problems

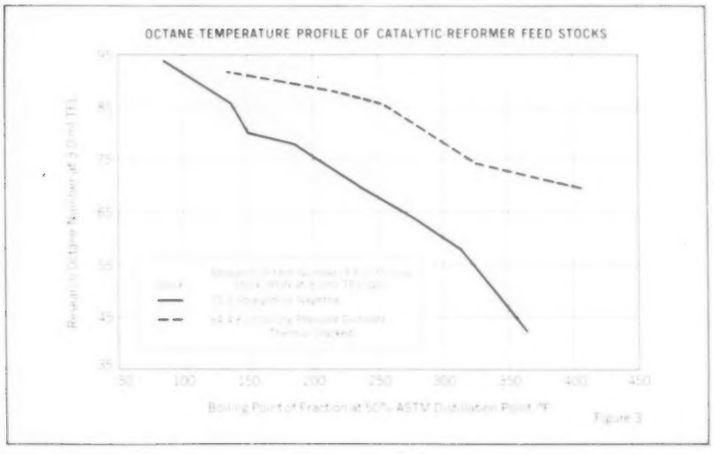
"Octane profiles" help in understanding some low-speed knocking problems.

In engines where the vapor and liquid portions of a fuel are unevenly distributed to the cylinders, TEL may tend to concentrate in the heavier fraction.

Maldistribution usually is most pronounced in the first seconds of wide open throttle accelerations. The problem is aggravated with fuels of low tetraethyllead levels since lighter components may be practically free of antiknock agent upon entering a cylinder during the first moments of acceleration.

With fuels having low-octane front-end components, low-speed road-knock may occur since the front-end octane level may be 5 to 10 numbers below the octane of the whole fuel. The portion of the fuel causing this difficulty can be isolated by fractional analysis. These problems may be solved by replacing the low-boiling, low-octane fraction with higher quality material.


OCTANE-TEMPERATURE PROFILE OF REFORMATES FROM FOUR DIFFERENT CATALYTIC REFORMING PROCESSES
Research Octane Number at 3.0 ml TEL
100 125 150 175 200 225 250 275 300 325 350 375 400
Boiling Point of Fraction at 50% ASTM Distillation Point, °F
Figure 2


OCTANE-TEMPERATURE PROFILE OF CATALYTIC-REFORMER FEED STOCKS
Research Octane Number at 3.0 ml TEL
50 100 150 200 250 300 350 400 450
Boiling Point of Fraction at 50% ASTM Distillation Point, °F
Figure 3

How Ethyl Research is helping you

Ethyl Research is continually utilizing its extensive laboratory fractionating facilities to help refiners in these ways:

1. To develop quality distribution data for octane improvement studies.
2. To evaluate charge stocks.
3. To understand unusual fuel knock problems.

Results of several of these studies can be found in Ethyl's report, "Fractional Analysis of Some Refinery Process Streams."

Copies of the report are available from your Ethyl Representative, or by writing to Ethyl Corporation, 100 Park Avenue, New York 17, New York.

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EXPLORATORY TESTS, EASTERN CANADA — 1958

	Oil	Gas	Dry	Total	%Successful
Southwestern Ontario					
Devonian	—	—	14	14	0.0
Silurian — Salina-Guelph	3	4	50	57	12.3
Clinton-Cataract	—	2	3	5	40.0
Ordovician-Cambrian	1*	2*	20	23	13.0
	4	8	87	99	16.3
Quebec					
Silurian	—	—	1	1	0.0
Ordovician-Cambrian	—	—	12	12	0.0
	—	—	13	13	0.0
Maritimes					
Upper Mississippian	—	—	1	1	0.0
Lower Mississippian	—	—	4	4	0.0
	—	—	5	5	0.0
Development Wells					
Southwestern Ontario					
Devonian	3	—	5	8	42.5
Silurian — Salina-Guelph	14	33	17	64	73.4
Clinton-Cataract	—	105	38	145	72.4
Ordovician-Cambrian	1	4	1	6	83.3
Others (Storage, injection, Structure tests, etc.)	—	—	—	32	—
	18	142	61	255	67.9

*One oil and one gas discovery were made in the Guelph (Silurian) in two of the deep wells drilled offshore.

Source: Report for the June issue of the AAPG *Bulletin*, prepared by W. A. Roliff, assisted by Mrs. Sally Pengelley and J. E. S. Milne.

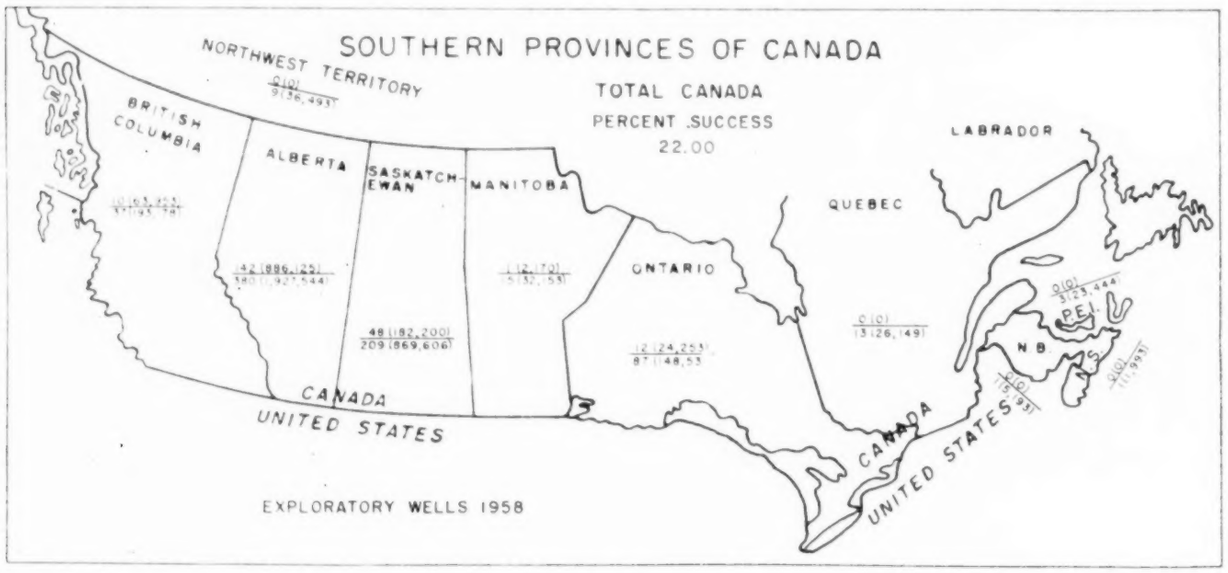
a 9% increase over the 1957 total of 877. Pembina accounted for 48.5% of the successful oil development wells drilled during 1958. Development of more recently discovered fields such as Harmattan East, Innisfail, Joffre (Nisku), Keystone, Swan Hills, and Kaybob proceeded at a brisk pace.

Two Leduc (D-3) reef finds in west-central Alberta, about 170 miles northwest of Edmonton, rank as the important discoveries of the past year. The first, British American-Shell Berland River No. A-8-4 (Lsd. 8-4-59-23 W.4), opened up reef prospects in a virtually unexplored area by finding the deepest productive Leduc reef (depth 12,014 ft) in Alberta. The discovery rates as the most prolific gas well in Canada, with a pay thickness of 550 ft and a calculated absolute open flow of 1.5 billion cubic feet per day. The size of the reservoir is still unknown because the only other deep test drilled in the vicinity last year, Pan American Berland River 10-10 (Lsd. 10-10-58-25 W.5), found the Leduc reef water-laden.

The second discovery, and the year's most promising oil find, would have to be credited to the Shell-Petrol Simonette No. 12-9 well (Lsd. 12-9-63-25 W.5) drilled north of the Berland River area in west-central Alberta, about 170 miles northwest of Edmonton. Shell Oil and their associates discovered an oil- and gas-bearing Leduc reef with a reported pay thickness of over 100 ft. The well flowed gas at the rate of 3,200 mcf per day on drill-stem test and, after acidizing, was capable of a restricted flow potential of 528 bbl of 47.5 API gravity oil per day. An earlier well, drilled by the group in 1956, Shell-Petrol-Explorers-Simonette 9-9 (Lsd. 9-9-62-26 W.5), was the first to encounter Leduc reef development, but found it water-laden. The only other venture in the immediate area to drill deep enough for possible Leduc reef before the discovery was Pan American Waskahigan 1-6 (Lsd. 1-6-64-25 W.5) which was abandoned in March of this year after failure to contact Leduc reef.

Several interesting Slave Point discoveries during the past year continued to draw interest to the Swan Hills-Virginia Hills-Whitecourt areas located about 120 miles northwest of Edmonton. The Slave Point, a carbonate formation at the base of the Upper Devonian Beaverhill Lake group, became an important producing formation in 1957 with the discovery of the Swan Hills, Virginia Hills, and Kaybob oil fields. The most prolific Slave Point producer drilled during 1958 was the Pan American-British American Swan Hills 14-33 well (Lsd. 14-33-66-10 W.5), located about two miles south of the Swan Hills field. This well penetrated some 250 ft of oil pay and rates a potential of 1,344 b/d. Other significant discovery wells which widened the prospective area of Slave Point oil accumulation include Pan American Morse River 4-13 (Lsd. 4-13-66-10 W.5), McColl MicMac Swan Hills 10-14 (Lsd. 10-14-69-9 W.5), Mobil Whitecourt 6-1 (Lsd. 6-1-62-12 W.5), and Mobil N. Whitecourt 8-28 (Lsd. 8-28-62-12 W.5).

The Red Earth Creek area, 100 miles north of Swan Hills, added a second principal prospective zone with the discovery of Slave Point oil in a wildcat north of the Red Earth "Granite Wash" pool. The well,



EXPLORATORY DRILLING IN CANADA IN 1958

Province	Well Classification	Oil		Gas		Total Producers		Dry Holes		Grand Total	
		Number	Footage	Number	Footage	Number	Footage	Number	Footage	Number	Footage
Alberta	Outposts	24	148,295	19*	105,223	43	253,518	48	210,813	91	464,331
	New-Pool Wildcats	13	64,968	18**	135,698	31	200,666	27	141,561	58	342,227
	Deeper-Pool Tests	0	0	0	0	0	0	15	22,855	15	22,855
	Shallower-Pool Tests	0	0	7	23,059	7	23,059	1	8,495	8	31,554
	New-Field Wildcats	21	156,242	40	252,640	61	408,882	289	1,543,820	350	1,952,702
	Total	58	369,505	84	516,620	142	886,125	380	1,927,544	522	2,813,669
British Columbia	Outposts	1	4,684	1	7,152	2	11,836	4	19,941	6	31,777
	New-Pool Wildcats	0	0	0	0	0	0	0	0	0	0
	Deeper-Pool Tests	0	0	1	2,890	1	2,890	4	1,714	5	4,604
	Shallower-Pool Tests	0	0	0	0	0	0	0	0	0	0
	New-Field Wildcats	4	21,574	3	27,653	7	49,227	29	171,523	36	220,750
	Total	5	26,258	5	37,695	10	63,953	37	193,178	47	257,131
Manitoba	Outposts	1	2,170	0	0	1	2,170	1	2,448	2	4,618
	New-Pool Wildcats	0	0	0	0	0	0	0	0	0	0
	Deeper-Pool Tests	0	0	0	0	0	0	0	0	0	0
	Shallower-Pool Tests	0	0	0	0	0	0	0	0	0	0
	New-Field Wildcats	0	0	0	0	0	0	14	29,705	14	29,705
	Total	1	2,170	0	0	1	2,170	15	32,153	16	34,323
Northwest Territories	New-Field Wildcats	0	0	0	0	0	0	9	36,493	9	36,493
	Total	0	0	0	0	0	0	9	36,493	9	36,493
Saskatchewan	Outposts	17	66,262	1	2,400	18	68,662	19	80,075	37	148,737
	New-Pool Wildcats	12	45,874	2	4,454	14	50,328	35	136,477	49	186,805
	Deeper-Pool Tests	0	0	0	0	0	0	3	13,987	3	13,987
	Shallow-Pool Tests	0	0	0	0	0	0	0	0	0	0
	New-Field Wildcats	14	59,446	2	3,764	16	63,210	152	639,067	168	702,277
	Total	43	171,582	5	10,618	48	182,200	209	869,606	257	1,051,806
Total Western Canada	Outposts	43	221,411	21	114,775	64	336,186	72	313,277	136	649,463
	New-Pool Wildcats	25	110,842	20	140,152	45	250,994	62	278,038	107	529,032
	Deeper-Pool Tests	0	0	1	2,890	1	2,890	22	38,556	23	41,446
	Shallower-Pool Tests	0	0	7	23,059	7	23,059	1	8,495	8	31,554
	New-Field Wildcats	39	237,262	45	284,057	84	521,319	493	2,420,608	577	2,941,927
	Total	107	569,515	94	564,933	201	1,134,448	650	3,058,974	851	4,193,422
Ontario	Outposts	1	1,885	2	6,424	3	8,309	6	8,938	9	17,247
	New-Pool Wildcats	0	0	2	3,146	2	3,146	21	38,966	23	42,112
	Deeper-Pool Tests	1	215	0	0	1	215	9	14,908	10	15,123
	Shallow-Pool Tests	0	0	0	0	0	0	1	476	1	476
	New-Field Wildcats	2	4,637	4	7,946	6	12,583	50	85,243	56	97,826
	Total	4	6,737	8	17,516	12	24,253	87	148,531	99	172,784
New Brunswick	New-Field Wildcats	0	0	0	0	0	0	1	5,193	1	5,193
	Total	0	0	0	0	0	0	1	5,193	1	5,193
Nova Scotia	New-Field Wildcats	0	0	0	0	0	0	1	1,993	1	1,993
	Total	0	0	0	0	0	0	1	1,993	1	1,993
Prince Edward Island	New-Field Wildcats	0	0	0	0	0	0	3	23,444	3	23,444
	Total	0	0	0	0	0	0	3	23,444	3	23,444
Quebec	New-Field Wildcats	0	0	0	0	0	0	13	26,149	13	26,149
	Total	0	0	0	0	0	0	13	26,149	13	26,149
Total Eastern Canada	Outposts	1	1,885	2	6,424	3	8,309	6	8,938	9	17,247
	New-Pool Wildcats	0	0	2	3,146	2	3,146	21	38,966	23	42,112
	Deeper-Pool Tests	1	215	0	0	1	215	9	14,908	10	15,123
	Shallow-Pool Tests	0	0	0	0	0	0	1	476	1	476
	New-Field Wildcats	2	4,637	4	7,946	6	12,583	68	142,022	74	154,605
	Total	4	6,737	8	17,516	12	24,253	105	205,310	117	229,563
Total Canada, all classes		111	576,252	102	582,449	213	1,158,701	755	3,264,284	968	4,407,787

*Includes 1 gas-condensate well.

**Includes ? gas-condensate wells.

Source: Report prepared for the *AAPG Bulletin*, June 1959. This is the second year that B. W. Blanpied has prepared this report as chairman of the Committee on Statistics of Exploratory Drilling, a standing committee of the American Assn. of Petroleum Geologists. Dr. Frederick H. Lahee prepared this analysis for 20 years, and Graham B. Moody one year prior to Mr. Blanpied's appointment.

Union Red Earth 4-20 (Lsd. 4-20-88-8 W.5), found 38.5-gravity oil on drill-stem test of the Slave Point. Although offset on three sides by dry holes, the discovery is significant in that it extended the possible hunting grounds for Slave Point oil accumulation 100 miles farther north, and gave added incentive to exploration in the Red Earth area by adding another prospective zone to the area which previously had been considered only a "Granite Wash" prospect. Union Oil also completed four successful "Granite Wash" wells in the vicinity of the Red Earth Creek field, which are either extensions to the field or separate reservoirs.

A significant wet-gas discovery was made at Carstairs in the Elkton member of the Mississippian Turner Valley formation along the erosional edge of the porous Elkton member. The discovery well, Home et al. Carstairs 10-17 (Lsd. 10-17-30-2 W.5), located about 12 miles southeast of the Harmattan-Elkton oil and gas field, encountered about 90 ft of net pay in the Elkton member. Canadian Superior Robertson 9-26 (Lsd. 9-26-30-3 W.5), about 3½ miles to the northwest of the field, was completed in 1951 as a potential Elkton gas well, but it appears to be in a different reservoir. Four other potential producers were drilled in the pool up to the end of 1958. The accumulation lies in a stratigraphic-type trap, limited by the erosional edge of the Elkton to the east and a water table downdip to the west.

There were several Mississippian gas discoveries along the foothills during 1958, which include Imperial Canadian Superior Stimson 6-17-15-2 (Lsd. 6-17-15-2 W.5), B-A Triad et al. Lovett River 12-30 (Lsd. 12-30-46-18 W.5), and Shell Panther River No. 1 (Lsd. 5-19-39-10 W.5). The Panther River well is interesting because it also found gas pay in the Devonian, which is a new gas zone for the foothills. The Devonian gas contains 85% hydrogen sulfide, and

(Continued on page 65)

Canada's oil laws reviewed

by D. E. Lewis*

Recently, new oil laws touched off an oil boom in a most unlikely place—Canada's frozen Arctic Islands—thereby proving how powerful a stimulant proper oil regulations can be to exploration even in such a difficult area.

LOOKING backward on the first decade of Canada's oil boom (since the Leduc dis-

LOOKING backward on the first decade of Canada's oil boom (since the Leduc discovery), the effect of her oil legislation on the industry's development can hardly be overestimated. Next to the geological conditions which permitted the discovery of oil in the first place, probably no other factor has been so influential in permitting the growth which has brought Canada into the fore of the world's oil-producing countries.

The legal regulation of Canada's oil is complex, and it must be borne in mind that there are few private holders of mineral rights. The great majority of lands available to the petroleum industry in western Canada and the Northwest Territories is owned by the government. In the case of lands within the province, the provincial government is the predominate owner and, in the case of the Northwest Territories, the federal government. This article reviews and compares the legal structures which govern oil's development.

Legislative Fields of Federal and Provincial Governments: The Crown (as the federal government is referred to in Canada) is the largest owner of oil and gas rights; for instance, in the province of Alberta approximately 86% of the minerals are Crown-held. The percentage is less in the provinces of Manitoba and Saskatchewan, but greater in the province of British Columbia. Until 1888 settlers in these western provinces got their mineral (and oil) rights; consequently the earlier settled areas lost more land to freeholders. For other reasons, companies such as the Hudson's Bay Co. and the Canadian Pacific Railway also received large grants, including mineral rights.

In the eastern provinces, legislation retained mines and minerals in the Crown in many instances, so there is no rule of thumb as to ownership in the Crown or in the freeholder. In any event, the Crown has considerable interests in mines and minerals.

The division of legislative authority between the federal government and the provinces is found in the Canadian constitution, known as the British North American Act. Sect. 91 to 95 lay out the main fields of each. Two vague or general references in Sect. 92 give the provinces the power to legislate over oil and gas generally. The act gives the province power over all matters of a merely local or private nature in the province and property and civil rights—which, of course, include oil and gas. An exception to the provincial powers reserves international and interprovincial lines of transport and communication to the dominion, so that interprovincial and international pipelines and the export of oil or gas comes under federal jurisdiction.

Crown legislation on the disposition of Crown lands in its various forms is based on the Crown's ownership of oil and gas rights. Crown legislation on conservation, drilling and production, right-of-entry, pipelines, gas export, mineral taxation, public utilities, and incidental matters affecting the oil and gas industry are based on its constitutional right. This distinction often leads to confusion in understanding petroleum legislation unless the reasons for the two groups of legislation are recognized and understood.

Dominion (Federal) Statutes and Regulations Affecting Petroleum: Disposition of Crown Lands—These cover statutes affecting lands controlled or owned by the federal government throughout the provinces and the Northwest Territories, including Indian lands, soldier settlement lands, national parks, and similar public lands owned or controlled by the federal government. The greater proportion, of course, is in the Northwest Territories; and disposition is made under the Territorial Lands Act and its regulations. The regulations were drawn in conjunction with members of the Canadian Petroleum Assn., and include ideas from the provinces of Alberta, Saskatchewan, British Columbia, and Manitoba land disposition, drilling and production regulations. The Comparison accompanying this article shows in some detail the disposition practices of Northwest Territories lands. Regulations have been passed and are effective for leasing other federal lands including public lands in the western provinces, Indian lands, and soldier settlement lands; but leases have not been granted for work in the national parks. The areas involved in these regulations are not great considering the territories. The actual exploration, drilling, and producing phases are subject to provincial legislation or Northwest Territories regulations on dominion-owned (dominion is equivalent to federal) lands.

Federal Disposition of Freehold Lands: The ordinary law of contract applies in all cases, whether it be in areas of federal or provincial legislation.

General: Transportation outside the province is dealth with under the Railway Act or the Pipeline Act. Examples of major pipelines under federal jurisdiction would be Inter-provincial Pipe Line, Trans Mountain, Trans-Canada Pipe Line, Westcoast Transmission, Westspur, and the like. Under this Pipeline Act, all pipeline companies have to be incorporated by act of the federal parliament before it is effective. In this way, the parliament of Canada has a direct interest in who may own or operate federal pipelines. Export of oil or gas falls within the ambit of the Exportation of Power and Fluids and Importation of Gas Act.

Income-tax, tariff, and excise legislation also affects the industry, and generally is federal in nature. Sect. 82 of the Federal Bank Act deals with the security on bank loans via oil and gas properties.

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COMPARISON OF THE LEGISLATION IN REGARD TO THE ACQUISITION OF CROWN PETROLEUM AND NATURAL GAS RIGHTS IN WESTERN CANADA

Revised March 1, 1959

RESERVATION OR PERMIT STAGE	ALBERTA	BRITISH COLUMBIA	NORTHWEST TERRITORIES	SASKATCHEWAN	MANITOBA
Area	100,000 acres maximum.	One grid area; Suzes: Max. 127,000 acres; min. 96,300 acres.	One grid area as defined Max. 63,850 acres. Min. 43,989 acres.	100,000 acres.	200,000 acres for a permit. 10,000 acres for a drilling permit
Number of Permits	Two applications only permitted any company in one year.	No limit — There are 3 classes of Permits, namely: A, B, and C; dependent upon inaccessibility of terrain, etc.	No limit.	No limit.	No limit.
Term	4 months — Renewable for maximum of 20 months. Further renewals at Minister's discretion or upon drilling.	Class A & B — one year, renewable annually for 4 years, three further renewals of up to one year with approval of the Minister. Class C — one year, renewable annually for 7 years, further renewals on such terms and conditions as the Minister may impose.	3 years renewable for a maximum of a further 6 years plus further renewals as allowed by Minister. North of 70° latitude the original term is six years plus a further six-year renewal.	3 years with further renewals in the Northern part of the Province in the Minister's discretion. All requirements of third year apply to subsequent years.	A. Permit up to 3 years. B. Drilling Permit 60 days, may be renewed for up to 12 months.
Fees		$250.00 for Permit or any renewal thereof.	$250.00	No fee.	$250.00 for both
Deposit	$2,500.00 for each 20,000 acres.	Nil.	North of 70°, 5¢ for the first three years and 25¢ for the next three years (per acre).	$10,000.00 if Permittee desires to withhold information after expiration of Permit.	$750.00 per 20,000 acres if Surface Geological work. $2000.00 per 20,000 acres if Sub-Surface Geological work.
Rentals	1st year — nil 2nd year — 30¢ per acre 3rd year — 70¢ per acre Next six months — 50¢ per acre	5¢ to 25¢ depending on year and type of permit.	Nil.	1st year — 2¢ per acre 2nd year — 5¢ per acre 3rd year — 10¢ per acre	½¢ per acre.
Work Obligations	To satisfaction of Minister.	Each permit on a separate basis — 10¢ to 75¢ per year.	Equal to deposit (cost of drilling deep test well may be doubled when applying to work obligations).	Commence operations within 90 days. Spend 20¢ to 60¢ depending on year.	Permit. Must spend 30¢ an acre during 3-year period.
Credits	50% of approved expenditures in reservation stage may be applied to the rental for one year of any lease required out of any reservation.	Excess work may be deemed to be work done or made up under the lease for the first two years of the term of the lease. Approved expenditures in excess of year to year renewal requirements for three subsequent years.	Exploration expenditures in excess of deposit allowed as credit, for succeeding periods of permit.	Exploration expenditures in excess of required amounts are credited for similar work to Permittee for following year. Credit cannot exceed one-half work obligation.	Permit. Up to 75% of exploration expenditures may be applied for first year lease rental. Drilling permit: Same as Permit.
Grouping	Nil (Not provided for by legislation but allowed by arrangement with Minister).	May group permits not exceeding five grids in area if permits are contiguous or partially within a circle having a radius of 50 miles.	May group an area which could be included in 20 permits if: (a) within 50 mile radius; or (b) contiguous. Special consideration for exploration or costs attributable to a large area.	May group on approval of the Minister.	May group contiguous reservations, but not exceeding 3 in number, for the purpose of carrying out the investigations required by these regulations.
LEASE STAGE Amount	Geometric or checkerboard pattern with one mile corridor between blocks. Up to 50% in any township may be leased.	Geometric or checkerboard pattern with 2 unit corridor between leases. No more than 50% of permit.	Not less than one-quarter section and not more than 50% of permit area. Geometric or checkerboard pattern.	Geometric or checkerboard pattern with one mile between blocks. Percentage depends on size of block.	Except from permits no person can acquire more than 9,600 acres except by assignment. Up to 50%.
Credits	50% of approved expenditures in the reservation stage may be applied on first year's rental.	See Reservation Stage. 75% credit first 2 years.	Permit expenditures on exploratory work in excess of deposits required may be applied on account of yearly rental of leases taken out of permit up to 50% of such rental.	Expenditures in excess of those required to maintain Permit in good standing may be applied to first year's rental.	Credit given for exploration expenditures can be used for rentals on any lease within 25 miles of wellsite for up to 3 years, all on approval of the Director.
Size	Maximum 9 sections if square 8 sections if rectangular Minimum ¼ section	Outside Peace River Block a lease shall be four-sided in shape from two by two to section by section limits.	Maximum four units by four units or five units by three units minimum.	Grouped in units. Maximum 36 sections. Minimum 1 legal subdivision.	Maximum 3 sections. Minimum ¼ section.
Shape	Square or rectangular, length not more than twice width.	Square or rectangular.	Square or rectangular in shape, dimensions must be integral multiples of 1320'.	Rectangular. No side longer than 3½ miles.	Length not to exceed three times width.
Description	A. Surveyed Territory By Sections and components thereof. B. Unsurveyed Territory Described by boundary lines running north, south, east and west astronomically and measurements thereof are horizontal.	As outlined in prescribed form for application for lease.	Described by sections and parts thereof accompanied by a plan.	A. Surveyed Territory By sections and component parts thereof. B. Unsurveyed Territory A plan and description satisfactory to Minister.	A. Surveyed Territory Sections and component parts thereof. B. Unsurveyed Territory Described by metes and bounds accompanied by plan showing the location in relation to some topographical feature.
Rental	$1.00 per acre per year or 50¢ per acre per year if in a definite gas area.	P. & N.G. Lease $1.00 per acre per year. Gas Lease 40¢ per acre per year.	50¢ per acre in first year. $1.00 per acre per year in succeeding years.	$1.00 per acre; may be reduced if gas only.	50¢ an acre in primary term. If no production in primary term $1.50 an acre in secondary term.
Term	21 years, renewable upon production.	21 years or 10 years. Renewable upon production.	1 year with renewals for 21 years if lessee not in default.	21 years renewable upon production.	Term 3 years plus 6. If no production at end of term renewal at Minister's discretion.

(Continued)

COMPARISON OF THE LEGISLATION IN REGARD TO THE ACQUISITION OF CROWN PETROLEUM AND NATURAL GAS RIGHTS IN WESTERN CANADA (Concluded)

Revised March 1, 1959

RESERVATION OR PERMIT STAGE	ALBERTA	BRITISH COLUMBIA	NORTHWEST TERRITORIES	SASKATCHEWAN	MANITOBA
Work Obligations	1. Within one year commence drilling. 2. Upon abandonment commence another in 6 months. 3. Upon completion of well drill another in 90 days.	If leases granted before sufficient work done to hold a permit for 5 years, the lessee must covenant in lease to do work for each lease equal to the minimum work required to hold an exploration permit for a period of 5 years.	1. Commence drilling within 3 years, continue to satisfaction of Minister — extension may be granted. 2. Within 1 year of abandonment drill further well — may be extended. 3. Drilling requirements under 1. May be extended if exploratory work in excess of deposit required.	1. Within 6 months after request by Minister commence drilling. 2. Continuous drilling thereafter.	1. Within 1 year commence drilling. 2. Within 6 months of completion or abandonment drill another. 3. Further drilling in accordance with Regulations.
Grouping	May group leases situated within a 3 mile radius, but not more than 18 sections can be included in one group.	May group leases in area not exceeding 144 units and some part of each lease shall be in circle with radius of 12 miles.	May group leases not to exceed 22,400 acres and some portion of each lease area included in group within 12 miles of projected well-site. Group terminates on discovery of oil and gas in commercial quantities. Lessee may group or regroup from time to time.	May group leases up to 36 Secs. but no area can be included if it is more than 2 miles from another area included in group.	May group 30 sections within 25 miles.
Royalty (See Schedule attached)	As in Regulations but maximum is 16⅔%. Present Regulations have royalty for crude varying from 5% to 16⅔% depending on production. Present natural gas royalty is 15% with minimum of ¾¢ per mcf.	(i) liquid hydrocarbons — 12½% (ii) natural gas — 15% or ¾¢ per mcf. (iii) crude petroleum — sliding scale with min. 5% and max. 16⅔%.	All products first 3 years 6½%, thereafter 12½% and Minister may reduce if believed advisable.	Crude oil and products — percentage varying from 5% to 16% depending on production. Natural Gas — 8% of sale value with minimum of ½¢ per mcf. Other products — 8% of sale value.	12½% on crude and products. 12½% for natural gas. Minimum of ¼¢ per mcf.
Right of Entry	Immediate right of entry on order of Board of Arbitration.	Board may grant immediate right of entry.	1. Right of entry granted unless previously disposed of. 2. Right of entry on patented lands apply to Minister for permission to arbitrate. 3. Minister may give permission to enter if Lessee undertakes to arbitrate and deposit bond.	If no Agreement with surface owner application to Minister for immediate entry.	In accordance with Arbitration Act R.S.M. 1954 Ch. 9.
Pertinent Legislation	1. Mines and Minerals Act and regulations thereto.	Petroleum and Natural Gas Act, 1954, as amended.	1. Territorial Lands Act. Regulations thereunder.	1. Mineral Resources Act and Regulations themselves.	1. The Mines Act and Regulations thereunder.

Provincial Acts and Regulations: Alberta was the first province which considered legislation on oil and gas matters in a serious way—and, being the pioneer in the field, it set the stage. Other western provinces have watched it and modeled their legislation on it where it suited their political atmosphere or conditions. In dealing with this heading, Alberta is used as an example, and other western provinces are dealt with by name only where there is a material difference.

Provincial Disposition of Crown Lands: In Alberta, this is handled under the Mines and Minerals Act, and in other provinces by similar acts. This act is divided into eight parts. Part *VI* is headed "Petroleum and Natural Gas," and is most applicable. This part provides for the granting of a "reservation"; sets up Crown reserves; and allows as a basis for petroleum and natural gas rights the property of the Crown. The granting of a reservation is detailed in the regulations under this act. Provisions respecting the lease and Crown reserves are dealt with in the main in the act itself, although the royalties payable are the subject of a regulation.

Crown reserves may be divided into two groups as follows: (1) those lands which in 1941 were set aside as provincial reserves and on which no application or leases have been accepted; (2) the lands which are set up as Crown reserves at the time leases are selected from reservations. Those in the first group are 14 in number, and extend from one end of the province to the other.

At opportune times, or upon application from a company to have any part of the Crown reserves in the first group made available to industry, the government may offer for reservation or lease any area of a size to meet the application. This may be done by the government's asking for sealed tenders offering a bonus. Those in the second group similarly may be applied for from time to time by companies or individuals who wish to lease any part of them; or, without application being made, they may be made available on a competitive basis in blocks from 40 acres to 640 acres. It is in order for any company or individual to bid on any number of these areas as they are put up for tender. There are very few of those in the second group still available.

The government may also dispose of rights in Crown reserves by granting drilling reservations where drilling is a prerequisite.

Regulations also exist for the licensing of natural-gas rights, the property of the Crown for drilling of wells, and for the granting of licenses of natural-gas rights in Crown reserves. The former allows a reservation holder to hold prosepective gas zones at lower rentals than petroleum and natural-gas reservations, provided he surrenders all rights other than gas in the requested zone. Leases will only be granted if the zone proves productive. The latter allows the Crown to grant gas rights in Crown reserves. Drilling must be commenced within three months. Leases are granted for the productive zones only. The British Columbia legislature at its last sitting adopted a system of gas licenses very similar in operation to that of Alberta.

Part VII deals with geophysical and geological exploration. Most of this is done along roads in built-up or farming areas. Regulations under this part deal in some detail on the conduct of exploration programs. Part VIII deals with the registration of assignments of granted rights, and may be enlarged in application in the near future.

Provincial Acts of General Application: (1) *The Oil and Gas Conservation Act and Similar Acts*—The development, production, and marketing of gas and oil in the province is handled by the Gas Resources Preservation Act.

The Oil and Gas Conservation Act was passed first in 1938, and provided for the establishment of a Petroleum and Natural Gas Conservation Board. The board was given the responsibility of administering this act and the Oil and Gas Wells Act. These old acts were repealed in 1950 and consolidated. In 1957 a revision was made.

ROYALTIES PAYABLE IN RESPECT OF CROWN PETROLEUM AND NATURAL GAS RIGHTS IN WESTERN CANADA

The Province of Alberta
O.C. 801-51

Petroleum and Natural Gas Royalty Regulations
established by Order in Council dated the fifth
day of June, 1951, and numbered O.C. 808/51.

1. The royalty to be computed, levied and collected by the Crown in the right of the Province on all products obtained from a petroleum and natural gas location or a natural gas location shall be that part of the products obtained from each well during each calendar month calculated free and clear of any deductions whatsoever as follows:

(a) With respect to crude petroleum oil, in accordance with the Schedule hereto attached;

(b) With respect to other fluid hydrocarbons and sulfur obtained by processing natural gas by absorption or other methods approved by the Minister of Mines and Minerals, twelve and one-half (12½%) percent; and

(c) With respect to natural gas or residue gas sold or consumed for some useful purpose, fifteen (15%) percent of the selling price or fair value at the time and place or production; provided that in no event shall the royalty on natural gas or residue gas be less than three quarters of one cent (¾¢) per thousand cubic feet (Mcf).

Schedule

"Barrel" means 35 Imperial gallons

Monthly Production in Barrels	Crown Royalty for the Month in Barrels
0 to 600	5% of the number of barrels produced.
600 to 750	30 plus 14% of the number of barrels produced in excess of 600.
750 to 950	51 plus 17% of the number of barrels produced in excess of 750.
950 to 1,150	85 plus 18% of the number of barrels produced in excess of 950.
1,150 to 1,500	121 plus 19% of the number of barrels produced in excess of 1,150.
1,500 to 1,800	12½% of the number of barrels produced.
1,800 to 4,050	225 plus 20% of the number of barrels produced in excess of 1,800.
4,050 and over	16⅔% of the number of barrels produced.

The Province of Saskatchewan

On crude petroleum oil a percentage of the production from each well free and clear of any deductions whatsoever determined according to the following table:

Monthly Production in Barrels	Crown Royalty for the Month
0 to 600	5% of the number of barrels produced.
600 to 900	30 barrels plus 13% of the number of barrels produced in excess of 600.
900 to 1,500	69 barrels plus 17% of the number of barrels produced in excess of 900.
1,500 to 4,950	171 barrels plus 18% of the number of barrels produced in excess of 1,500.
4,950 and over	16% of the total number of barrels produced.

(b) On natural gas, 8% of the sale value or fair value thereof, whichever is the greater, at the time and place of production; provided that such royalty shall in no case be less than one-half of one cent per thousand cubic feet; provided further that no royalty shall be payable on natural gas consumed, exclusively for drilling or production purposes, on the parcel of land in respect of which the right to the natural gas is held.

(c) On all products other than crude petroleum oil and natural gas, including all products obtained by separation, absorption, or in any other manner, 8% of the total value thereof to the producer free and clear of any deduction whatsoever.

(d) Unless the Minister otherwise deems it to be advisable, where, the interest of the Crown in a drainage unit is pooled, the royalty rate shall, in the case of crude petroleum oil, be determined by the total production from the well and the volume of production to which such royalty rate shall apply shall be equivalent to the share of the production from the drainage unit allocated to the tract owned by the Crown. The share of the production from the drainage unit allocated to the tract owned by the Crown shall be in the proportion that the area of the Crown tract bears to the area of the whole of the drainage unit.

The Province of British Columbia
Petroleum and Natural Gas Act

Section 86

1. The royalty to be computed, levied, and collected by the Crown in right of the Province on all petroleum and natural gas obtained from a location shall be that part of the petroleum and natural gas obtained from each well during each calendar month, calculated free and clear of any deductions whatsoever, as follows:

(a) With respect to crude petroleum, in accordance with the schedule in Subsection (6); and

(b) With respect to other liquid hydrocarbons and sulfur obtained by processing natural gas by absorption or other approved methods, twelve and one-half per centum; and

(c) With respect to natural gas or residue gas, fifteen per centum, but not less than three-quarters of one cent per thousand cubic feet.

2. The schedule referred to in Clause (a) of Subsection (1) is as follows:

Monthly Production in Barrels	Crown Royalty for the Month in Barrels
0 to 600	5% of the number of barrels produced.
600 to 750	30 plus 14% of the number of barrels produced in excess of 600.
750 to 950	51 plus 17% of the number of barrels produced in excess of 750.
950 to 1,150	85 plus 18% of the number of barrels produced in excess of 950.
1,150 to 1,500	121 plus 19% of the number of barrels produced in excess of 1,150.
1,500 to 1,800	12½% of the number of barrels produced.
1,800 to 4,050	225 plus 20% of the number of barrels produced in excess of 1,800.
4,500 and over	16⅔% of the number of barrels produced.

The Northwest Territories

Territorial Lands Act — Territorial
Oil and Gas Regulations — P.C. 1957-521.

Section 43

1. Subject to subsections (2) and (3), a permittee or lessee shall pay to Her Majesty on the twenty-fifth day of each month during the period ending with the last day of the month during which commercial exploitation is deemed to have commenced and during the three years following that day a royalty of six and one-quarter per cent and thereafter of twelve and one-half per cent, of the market value at the well head during the month of production of all oil and gas sold, used or otherwise disposed of during the previous calendar month.

2. No royalty is payable on oil or gas consumed by the permittee or lessee for drilling or production purposes in the area included in a permit or oil and gas lease.

3. Whenever the Governor in Council is of the opinion that a reduction of royalty will enable the permittee or lessee to keep on winning oil or gas for a longer period of time, he may reduce the royalty to such extent and for such period or periods as he may from time to time determine.

6. No royalty shall be payable on oil or gas returned to a formation or flared.

7. Royalty shall be determined for oil by correcting the volume in barrels to the standard condition at 60° Fahrenheit and for gas in cubic feet as defined in paragraph (g) of subsection (1) of section 2.

The Province of Manitoba

Regulations under the Mines Act
1940 R.S.M., Ch. 136

Section 90

The royalty levied and collected by the Crown on all products of any location acquired under these regulations or under any regulations made by the Dominion of Canada prior to July, 1930, shall be:

(a) On all products other than natural gas, including all products obtained by separation, absorption, or in any other manner, twelve and a half per centum thereof if free and clear of any deduction whatsoever and where any products of a location, other than natural gas, are sold, until otherwise ordered by the Minister such sale shall include the royalty share of such products belonging to the Crown, and the moneys received from the sale of such royalty share, shall be forwarded to the Branch with the monthly return; and

(b) Or natural gas consumed for some useful purpose off the location or sold, twelve and one-half per centum of the selling price or if consumed off the location twelve and a half per centum of the fair value, provided that in no event shall the royalty be less than one quarter of one cent per thousand cubic feet of natural gas.

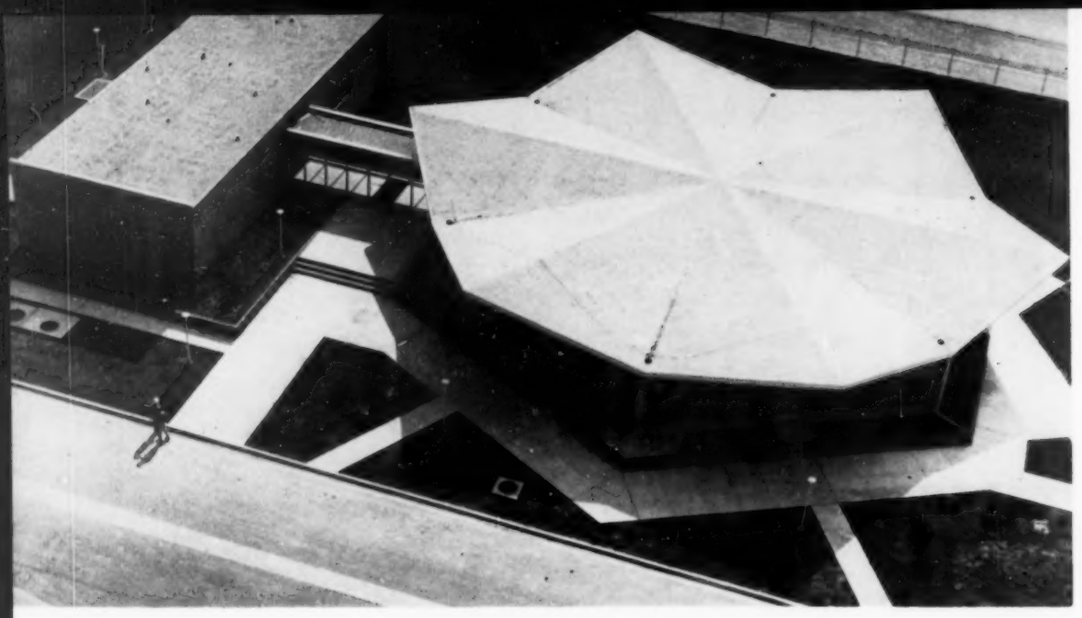
The purpose of this act as it now stands is to: (a) to effect the conservation of the oil and gas resources of the province; (b) to prevent the waste of the oil and gas resources of the province; (c) to secure the observance of safe and efficient practices in the locating, spacing, drilling, equipping, completing, reworking, testing, operating, and abandonment of wells, and in all operations for the production of oil and gas; and (d) to afford to each owner the opportunity of obtaining his just and equitable share of the production of any pool.

This act is also broken down into parts which really explain the act. Parts I and II set out the organization and constitution of the board and gives its general powers. It consists of three members, with a large staff to aid it in its work. Part III deals with licenses to drill. Part IV and V are most important. Part IV deals with drilling and production. Very detailed regulations exist respecting drilling and producing. These provide for spacing, production allowables, proration, testing, casing program, cementing, etc.

Part V deals with the powers of the board over transportation and the disposition of oil and gas. An oil pipeline under this may be designated a common carrier, and is subject then to the Public Utility Act. Also any company may be named a common purchaser in any area and be compelled to purchase oil pro rata. Neither of these sections is presently involved. Under this part, the board may direct a company, the owner of a well or proprietor of a gas pipeline or processing plant to gather and process distress gas, or otherwise treat it as directed. This can lead to considerable expense, as the direction is not subject to economic limitations— although these are given weight in practice. As explained later, these matters are subject to appeal in the new act.

Part VI deals with overriding provisions of an agreement, and Part VII provides

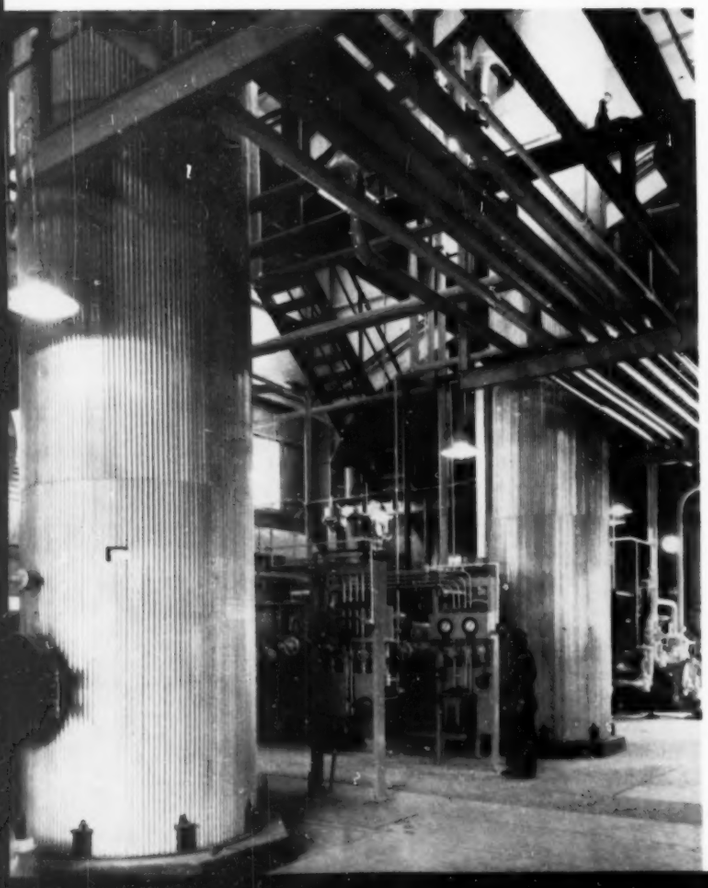
(Continued on page 94)



Control room at Imperial's Sarnia petrochemicals plant is connected by corridor with building containing lockers, lunch room, and offices.

Petrochemicals pass half-billion mark

Canadian ethylene capacity was doubled in 1958, and sulfur capacity in the west tripled when major gas lines were completed



At the B-A Pincher Creek plant, hot gas from the reactor furnace passes through these condensers to remove elemental sulfur in liquid form.

PETROCHEMICAL activity in Canada during 1958 was featured by completion of a plant based on refinery gases at Sarnia, and two major sulfur-recovery plants in the west operating on sour natural gas. Total investment in the three new plants was about $75 million, bringing total petrochemical plant value in Canada to $575 million.

The new $30 million Sarnia petrochemical plant is the second venture into this field by Imperial Oil Ltd. In the previous year, the company invested $38 million in a plant to produce detergent alkylates. The plant now is producing about 30 million pounds per year of such products as dodecyl benzene, tripropylene, tetrapropylene, and alkyl aromatics.

The 1958 construction program involved the processing of gases from Imperial's 87,500 b/d refinery to produce a wide range of chemical intermediates. It is the first privately owned plant in Canada to produce butadiene, and is located near the government-owned Polymer Corp. plant built during the war. Ethylene capacity of the Imperial plant more than doubles the amount formerly manufactured in Canada. Other

Central control panel at new British American Oil's Pincher Creek sulfur plant.

basic chemicals include propylene, normal and isobutylenes, aromatic distillates, and tars.

Located in the heart of Canada's "chemical valley," the Imperial plant supplies raw materials for other adjacent manufacturers of chemicals and plastics. In addition to the government's Polymer Corp., Dow Chemical Co., Cabot Carbon, and Ethyl Corp. have nearby plants, and Canadian Oil Companies Ltd. produce benzene, toluene, and xylenes as byproducts of Platforming.

Because most of the gas produced in western Canada is sour, it has become necessary to install sulfur plants since completion of the two major gas pipelines, Westcoast Transmission Co. from the Peace River district to the Pacific Northwest, and Trans-Canada Pipe Lines Ltd. from Alberta fields to the east. Canadian sulfur capacity was tripled during 1958, and still another large plant is due for completion this year.

Jefferson Lake Petrochemicals Ltd. began operating its 300-ton sulfur plant at Taylor, B.C., in February 1958. Steelman Gas Ltd. started up an 8-ton plant in October in Saskatchewan, and British American Oil Co. began operations of its huge 675-ton plant at Pincher Creek, Alberta, in October. Devon-Palmer Oils Ltd. and Texas Gulf Sulphur Co. will complete a 370-ton plant later this year, bringing western Canada capacity to 1,493 tons per day. In January 1957, partial operation was begun at Pincher Creek on a recycle basis because there was no outlet for the gas at that time. Completion of the Trans-Canada line enabled B-A to begin commercial gas production from one of the nation's most important reserves nearly 10 years after the field first had been discovered.

The wildcat which found Pincher Creek was drilled by Canadian Gulf (since merged with B-A) in 1947, and tested 45 million cubic feet. Ten wells have been completed in the field thus far, and this number will be increased to 25 as demand warrants.

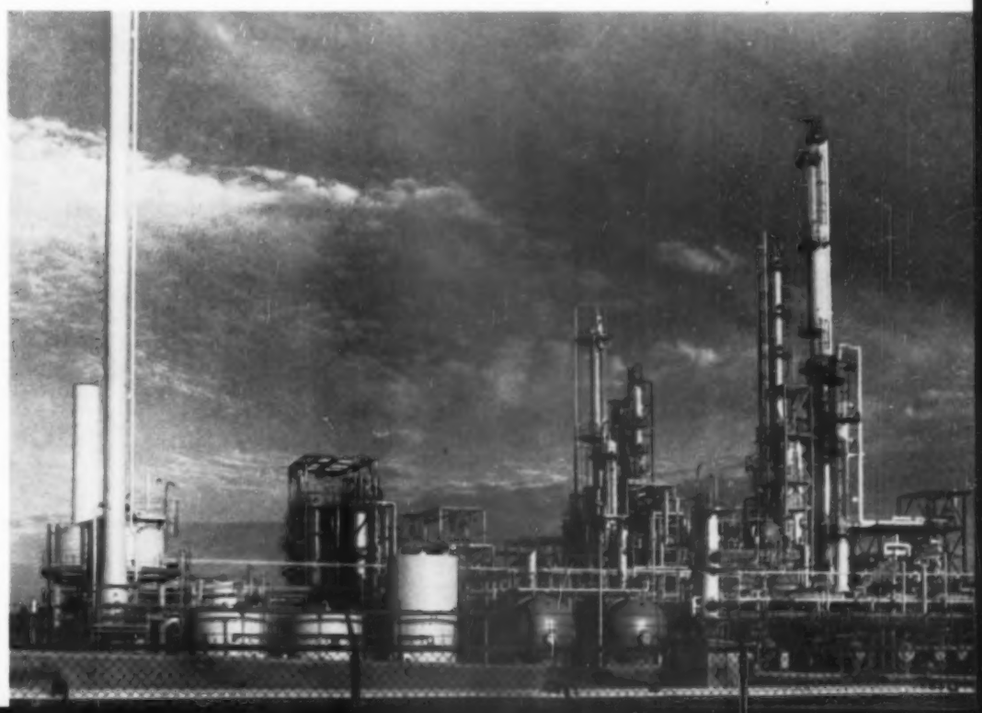
Gas for the new B-A plant emerges from the wells containing free liquids, and is separated at the wells at approximately 1,200 psig. Vapor and liquid are delivered to the plant by separate pipelines—the gas at about 1,000 psig, and the liquid at about 500 psig.

The gas goes to two inlet separators, each with a capacity of 120 mmcf per day. They remove hydrocarbon condensate. The gas then flows to the four high-pressure amine-treating units, where the hydrogen sulfide and carbon dioxide are removed by contact with a 20% solution of aqueous monoethanolamine. The "sweetened" gas is delivered to the main hydrocarbon absorber, where propane and heavier constituents are absorbed by a stream of lean stripping oil. Residue gas from the absorber is scrubbed to remove traces of oil, and then it goes to the gas-dehydration unit.

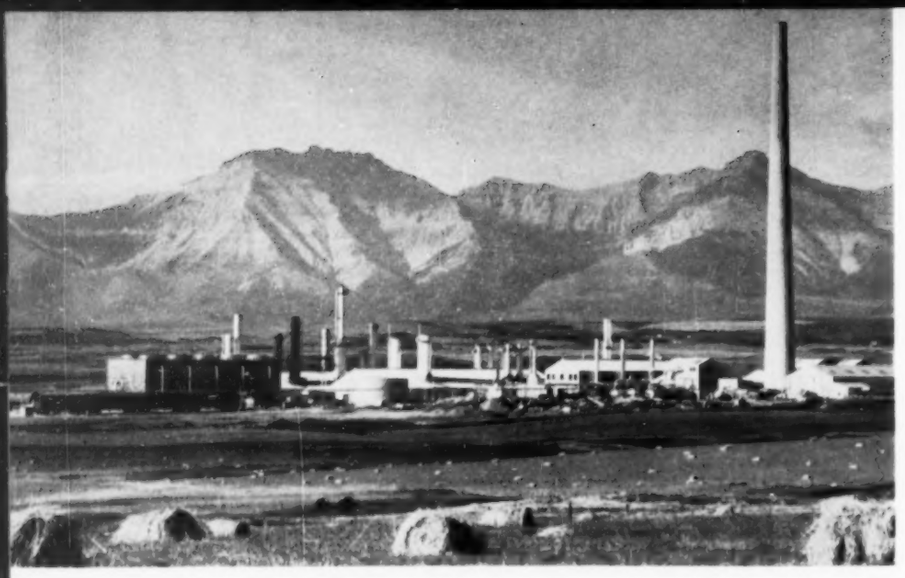
This unit has solid desiccant-type dehydration facilities for the reduction of water content of the gas to a maximum of 4 lb of water vapor to each million cubic feet of gas. There are two dehydration contactors—one of which can be used for regenerating, while the other is in operation. Dehydrated gas enters the pipeline at 900 psi.

The liquid phase from the well which, as has been noted, reaches the plant through its own separate pipeline, goes to a liquid separator, and thence to the condensate stabilization unit for removal of butane and lighter hydrocarbons.

Vapors flashed from the inlet liquid



Butadiene unit at Imperial Oil's new Sarnia petrochemicals plant will provide raw materials to the government-owned Polymer Corp. for making rubber. Feed for the unit is mainly a mixture of butylenes and butadiene, with a small amount of butane. At left is a cooker which recovers copper from spent cuprous ammonium acetate used in separating the butadiene. It is part of the $2 million worth of antipollution equipment installed in the plant.



British American Oil's $25 million Pincher Creek sulfur plant, largest single supplier of natural gas to the Trans-Canada Pipe Line. The 350-ft incinerator stack (right) was built to prevent pollution.

separator are delivered to the 500 psig vapor-amine contactor, where the hydrogen sulfide and carbon dioxide are removed with aqueous monoethanolamine. Vapors from the condensate stabilization unit are similarly treated by contact with aqueous monoethanolamine in the 125 psig vapor-amine contactor to remove the acid gases.

The sulfur-recovery plant at Pincher Creek consists of three basically identical units, each capable of producing 225 long tons a day. The process consists essentially of burning one-third of the H_2S so that it becomes SO_2, and then reacting this SO_2 with the remaining quantity of H_2S in the presence of a catalyst. This forms elemental sulfur.

Acid gas from the amine regenerator is delivered to the combustion chamber of the reaction furnace, where it is burned with a controlled amount of air. Heat is removed by the production of 175 psig steam, and some sulfur is condensed in the convection section of the reaction furnace. The gas is further cooled by passing it through the first sulfur condenser.

Heat is removed by generation of 60 psig steam, and more sulfur vapor is condensed. The gas is reheated by an auxiliary burner, passed through a catalytic converter—utilizing bauxite as the catalyst—and goes into the second sulfur condenser. More sulfur vapor is condensed, and heat is removed by generation of 60 psig steam.

The gas is reheated by the second auxiliary burner, and passed through the second catalytic converter to the third sulfur condenser. The gas stream is cooled by preheating the boiler feed water, and sulfur is condensed.

The gas stream than passes upward through a bed of raschig rings in the coalescer, which removes any entrained sulfur mist. The exit gas from the coalescer is burned in the incinerator, and the residual sulfur compounds are burned to SO_2 and water before being dispersed to the atmosphere through the stack.

The liquid sulfur produced in the process is withdrawn from the various points as it is condensed, and accumulated in the liquid sulfur tanks for discharge to storage.

Storage facilities consist of two 750-ton liquid-sulfur tanks, two 12,000-bbl condensate spheroid tanks, three 56,000-gal propane tanks, and three 56,000-gal butane tanks. In addition, a portion of the sulfur is solidified into large blocks for storage.

A 22-mile railroad spur line provides rail service between the plant and the CPR station at Brocket, Alberta.

There are extensive safety measures. Numerous alarms indicate malfunctioning of equipment, and the plant may be completely shut down in the event of an emergency by an automatic system from any one of several strategically located control points.

Special consideration was given to air and surface pollution in the design and installation of facilities. Residual sulfur gases are burned to SO_2 and discharge to the air through a 350-ft stack. Other waste gases are flared through a 200-ft stack, with a continuously burning pilot light to convert any H_2S to SO_2.

All liquid drips and drains in the plant are piped to the appropriate classifying system. Spent amine and other chemicals are drained to a special pit to prevent their escape from the plant.

Large and modern though the Pincher Creek gas plant already is, there are provisions for further expanding it.

Next large western plant to go onstream will be at midyear by Devon-Palmer, in conjunction with Texas Gulf Sulfur Co. Inc., which are working on an $8 million sulfur-extraction plant 12 miles southeast of Calgary, at the town of Okotoks.

The plant, which will process 30 mmcf of raw gas per day, will yield 12 mmcf of salable residue gas and 370 long tons of sulfur. On a yearly basis, salable products from the Okotoks plant could amount to approximately four trillion cubic feet of "sweet" gas and 126,000 long tons of sulfur.

END

Inside control room, colored panels form a three-pointed star at Imperial's Sarnia petrochemicals plant.

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Oil pipeline traffic drops

Oil pipeline expansion in Canada continued at a reduced pace in 1958. Interprovincial Pipe Line Co. added about 82 miles of loop at a cost of around $11.2 million during the year; and Trans Mountain spent some $6 million on facilities, most of it holdover from expansion plans formulated in 1957. This compares with about $56 million total in 1957, and both companies have reduced their expansion plans sharply for 1959. Interprovincial will spend about $3.7 million in 1959, having completed its expansion to catch up on estimated demand through 1960. Trans Mountain has considerably unused capacity, and plans to spend only about $300,000 in 1959 on new facilities. The major gathering systems to feed these two trunk lines made only minor additions during 1958 and likewise plan to retrench on expenditures during 1959.

During 1958, total net oil deliveries by Canadian trunk pipelines dropped 5.5%—to 274,772,792 bbl from 290,857,612 in 1957. Daily average delivery in 1958 was 752,802 bbl, compared with 796,870 in 1957. Exports via pipeline fell to 29,750,328 bbl from 54,878,720 in 1957, a drop of 45.8%.

Refinery products delivered during 1958 decreased slightly—to 44,056,079 bbl from 44,928,730. Of this total (1957 figures in brackets), refined gasoline accounted for 24,245,691 bbl (25,078,012); distillate fuels for 16,259,288 bbl (15,951,297); and refined oil and other products for 3, 551,100 bbl (3,899,421), according to reports.

TABLE I
DELIVERIES OF CRUDE OIL—MILLIONS OF BARRELS

	1958	1957
Western Canada	29.5	31.7
Clearbrook, Minn. (for St. Paul)	14.8	18.6
Superior area	5.2	5.4
For tankers at Superior	1.8	4.1
Michigan	1.3	1.7
Sarnia	41.4	37.9
Toronto	15.5	3.5
	109.5	99.9

TABLE II
SUMMARY OF PIPELINE OPERATING STATISTICS—1958

Barrels Handled—Daily Average		
Gathering Systems	Barrels	428,401
Trunk Lines	"	1,098,341
Total Barrel Miles (Trunk Lines)	Millions	98,142
Average Miles Per Barrel (Trunk Lines)	Miles	244.8
Employees and Earnings[1]		
Average Number[2]	No.	1,653
Total Salaries and Wages	$	9,320,141
Man Hours Worked by Wage Earners[2,3]	Hours	855,225

[1] Excludes Amurex Oil Development Co., Anglo American Exploration Co. Ltd., Anglo-Canadian Oils Ltd., Key Pipe Line Co. Ltd., Mid-Saskatchewan Pipe Lines Ltd., Mobil Oil of Canada Ltd., Nisku Products Pipe Line Co. Ltd., Peace River Oil Pipe Line Co. Ltd., Sarnia Products Line, Valley Pipe Line Co. Ltd., and Westpur Pipe Line Co.
[2] Includes salaried employees.
[3] Includes Overtime.
Source: Dominion Bureau of Statistics

TABLE III
TRANS MOUNTAIN—DELIVERIES BY DESTINATIONS—1958

	Barrels Per Day	
British Columbia refineries	56,431	69.7
Washington refineries	24,572	30.3
Tankers for offshore deliveries	—	—
	81,003	100.0

Operating revenues for 1958 decreased 12.2%—to $76,995,992 from $87,702,398 in 1957.

Interprovincial Pipe Line Has Good Year: 1958 was kind to Interprovincial, and the company's annual report showed an increase in earnings to $12,687,749 in 1958 (all figures in Canadian dollars), compared with $9,544,661 in 1957. On a per-share basis, the dividend amounted to $2.51 in 1958, compared with $1.89 in 1957.

1958 was the first full year of operation for the 156-mile extension from Sarnia to the Toronto area. Deliveries via the extension contributed materially in the record throughputs achieved during the year.

Approximately 9% more oil was received by Interprovincial for transportation in 1958 than in 1957. In terms of barrel-miles, throughputs increased to 114 billion from 95 billion. The additional pipeline movement to refineries in the Toronto area more than offset the shorter haul on some movements resulting from increased receipts at Cromer, Manitoba.

First delivery through the newly constructed delivery line to the Sun Oil Co. refinery at Sarnia was made in August 1958. Deliveries to the new Cities Service Oil Co. Ltd. refinery in the Toronto area commenced in October. Deliveries by areas are shown in Table I.

Completion of the second line between Edmonton and Superior has in many ways greatly facilitated Interprovincial's operations. Eight different types of crude oil are currently being transported in the system.

The volume of construction by Interprovincial during 1958 was not high. Between Edmonton and Regina, 82 miles of 24-in. diameter pipe were installed in four loops. This construction completed the second major diameter line which parallels the first pipeline between Edmonton and Superior.

Additional power was installed at four pump stations between Regina and Gretna. At each of these locations, one 2,040-hp diesel pumping unit was added. Stations located at Regina, Cromer, and Glenboro are now fully expanded, each having 11,760 installed horsepower. Glenavon station, also on the Regina-Gretna line section, was expanded to 9,720-hp. Provisions have been made to further expand this station when the need arises.

On the 30-in.-diameter pipeline between Superior and Sarnia, two pump stations were completed. The Gould City station, which has 4,400 installed horsepower, was accepted as ready for operation during September.

At Sarnia, Sun Oil Co. refinery was connected to the Interprovincial system by the installation of 1.2 miles of 24-in.-diameter pipe. Construction of this delivery line was completed during August. In the Clarkson-Port Credit area, 2.2 miles of 16-in.-diameter pipe were laid from the 20-in. main line to Cities Service Oil Co.'s new refinery at Trafalgar. Positive-displacement meters have been installed at the Cromer tank farm. Additional meter installations are planned at other tank-farm locations as soon as the need arises.

Interprovincial's 1959 Plans: Because present capacity is adequate for requirements as forecast through 1960, capital expenditure during 1959 will be low; expected to total about $3,682,000. 1959 construction plans include: (1) A new electrically-operated pumping station at Iron River, Mich., and a 4,450-hp electrically-driven station to be housed in an extension of the present building at Edmonton. (2) In the wholly-owned USA subsidiary, the Lakehead Pipe Line Co. Inc., the automatically controlled electrically driven pumping station, to be constructed at Iron River, Mich., will be powered at 6,150 hp. This will be the 21st pumping station on the 1,930-mile crude-oil pipeline.

With completion of the new facilities, capacity of the Interprovincial-Lakehead Pipe Line system will be increased to approximately 290,000 b/d out of Edmonton, 365,000 b/d from Cromer, and 300,000 b/d from Superior to the Michigan and Ontario markets.

Interprovincial's operating revenue reached $49,196,458 in 1958, a 20% increase over 1957. Operating expenses during 1958, at $7,401,053, increased only 5% over the previous year. A total of $11,200,311 was expended during the year for completion of the second line between Edmonton and Superior and expansion of other facilities.

As of the end of 1958, Interprovincial's facilities were as follows: *Mileage:* 1,930 miles main line—Redwater to Port Credit; 1,098 miles second line—Edmonton to Superior; 100 miles loop line—near Glenavon, Saskatchewan; total mileage—3,128. *Pipe diameters:* 16"—428 miles; 18-in.—363 miles; 20-in.—594 miles; 24-in.—772 miles; 26-in.—326 miles; 30-in.—645 miles; total, 3,128 miles.

Approximately eight million barrels of oil are required to fill the Interprovincial line. There were 18 pumping stations operating at the end of 1958, with two nearing completion. They are located at Redwater, Edmonton, Hardisty, in Alberta; Kerrobert, Loreburn, Regina, Glenavon, Saskatchewan; Cromer, Glenboro, Gretna, in Manitoba; Viking, Clearbrook, Deer River, in Minnesota; Superior, Saxon, in Wisconsin; Gould City, Indian River, Bay City, in Michigan and Sarnia, in Ontario.

Interprovincial has approximately 600 employees. As of December 31, 1957, the investment per employee was approximately $445,000.

Trans Mountain's Operations: The competition of foreign water-borne crude, plus depressed economic conditions in British Columbia, resulted in a decrease of 48%

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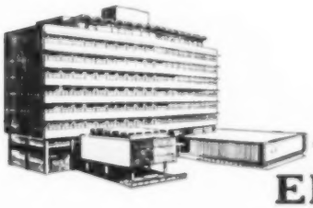

THE CITY OF
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in Trans Mountain's total deliveries of crude during 1958—down to 29,565,915 bbl, or an average of 81,033 b/d.

The outlook for 1959 is, according to the company, of the order of 86,500 b/d, only slightly better than the average for 1958, but considerably better than the average of 70,223 b/d for the last quarter of 1958.

The company showed a loss of $142.788 in 1958 (about 1.9 cents per share) compared with earnings of $8,305,785 ($1.10 per new share) for the year 1957. No dividends were paid in 1958. Reasons given by the company for the decline in net earnings were the loss of traffic mentioned above; the reduction in transportation charges of 5 cents per barrel, effective January 1, 1958; and increased costs of maintenance, depreciation, taxes, and interest resulting from construction and financing undertaken in late 1956 and 1957.

Capital expenditures during 1958 totaled $6,094,616—mainly against materials and work ordered during 1957 toward the next capacity expansion program. Capital expenditures during 1959 will be held, according to the company, to minimum requirements, now estimated at about $300,000. In an effort to reduce costs, the company has cut its personnel to 224 from 326.

Operation and Construction: No unusual problems were encountered in 1958. Unused pumping stations and equipment are being kept in a state of readiness except for manpower. The two 50-mile sections of 30-in. pipe constructed in 1957 have been used alternately with the paralleling 24-in. sections to keep the inside of the pipe in good condition.

Newly constructed refineries of The British American Oil Co. Ltd. at Port Moody, B.C., and of The Texas Co. at Anacortes, Wash., were placed onstream during the year and connected to the pipeline system. The British Columbia Electric Co. Ltd. has constructed a thermal power plant close to the pipeline at Port Mann, B. C., and a connection has been made to it also. During 1958, oil deliveries were made to The British American refinery, but none to these other newly constructed crude-oil users. Federated Pipe Lines Ltd. has constructed a pipeline from the Swan Hills area to Edmonton, Alberta, which has been connected to Trans Mountain's receiving terminal.

Gathering System: Pembina Pipe Line Ltd.—As a result of a throughput some 11% below that of 1957, Pembina Pipe Line Ltd. net income was down slightly in this, its fourth year of operations. Net income for the year ended November 30, 1958, amounted to $1,002,197, compared with the previous year's $1,095,079. A general increase in tariff of 2 cents per barrel, made May 1, 1958, brought about by the lowered throughputs.

Deliveries of crude oil at Pembina's Edmonton terminal during the year ended November 30, 1958, amounted to 34,457,000 bbl. Deliveries were made during the year to Interprovincial Pipe Line Co., Trans Mountain Oil Pipe Line Co., Imperial Oil Ltd. refinery, and British American Oil Co. Ltd. refinery. The disposition of deliveries was:

	Barrels
Interprovincial	26,812,000
Trans Mountain	2,487,000
Refineries at Edmonton	5,158,000
	34,457,000

The rate of construction of new facilities during the year in the Pembina, Keystone, and Willesden Green fields was reduced somewhat from that of prior years. In all, some 49 miles of pipeline were added to serve 71 new batteries. In addition, electrification of field pumps was continued at batteries where the economics indicated savings in operating expenses. At the year-end, 119 batteries were electrically operated, and the remainder used gas or gasoline.

Negotiations with Northwestern Utilities Ltd. were successfully completed during 1958, and approximately 27 miles of the 32-mile 16-in. loop line were sold on August 1. The remaining five miles, which terminate at Edmonton, are being utilized.

Progress was made during 1958 on Pembina's installation of lease automatic custody transfer facilities. Twenty batteries were so automated at the year-end, in all cases using positive-displacement meters.

Pembina's gross revenue for the year ended November 30, 1958, amounted to $4,978,701, a decrease of approximately 4%, compared with gross revenue in 1957. Operating expenses were reduced to $1,406,274, a decrease of approximately 14% compared with the previous year.

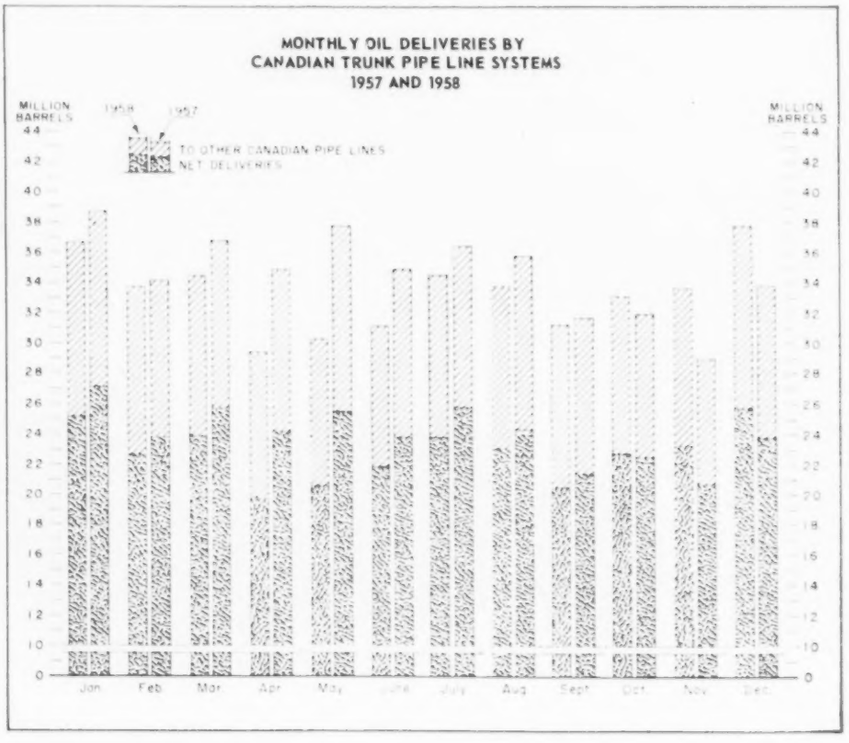
Pembina Pipelines has been actively pursuing a study of the possible movement by pipeline of natural gas byproducts, produced coincident with natural gas from wells in the foothills area. They include hydrogen sulfide, liquefied petroleum gases (propane and butanes), and condensate. A detailed international market study has been undertaken to determine the logical markets for those byproducts which are surplus to the ultimate needs of the province of Alberta. It has been determined that pipeline transportation is both technically and economically sound and the Foothills Products Pipeline is being actively pursued.

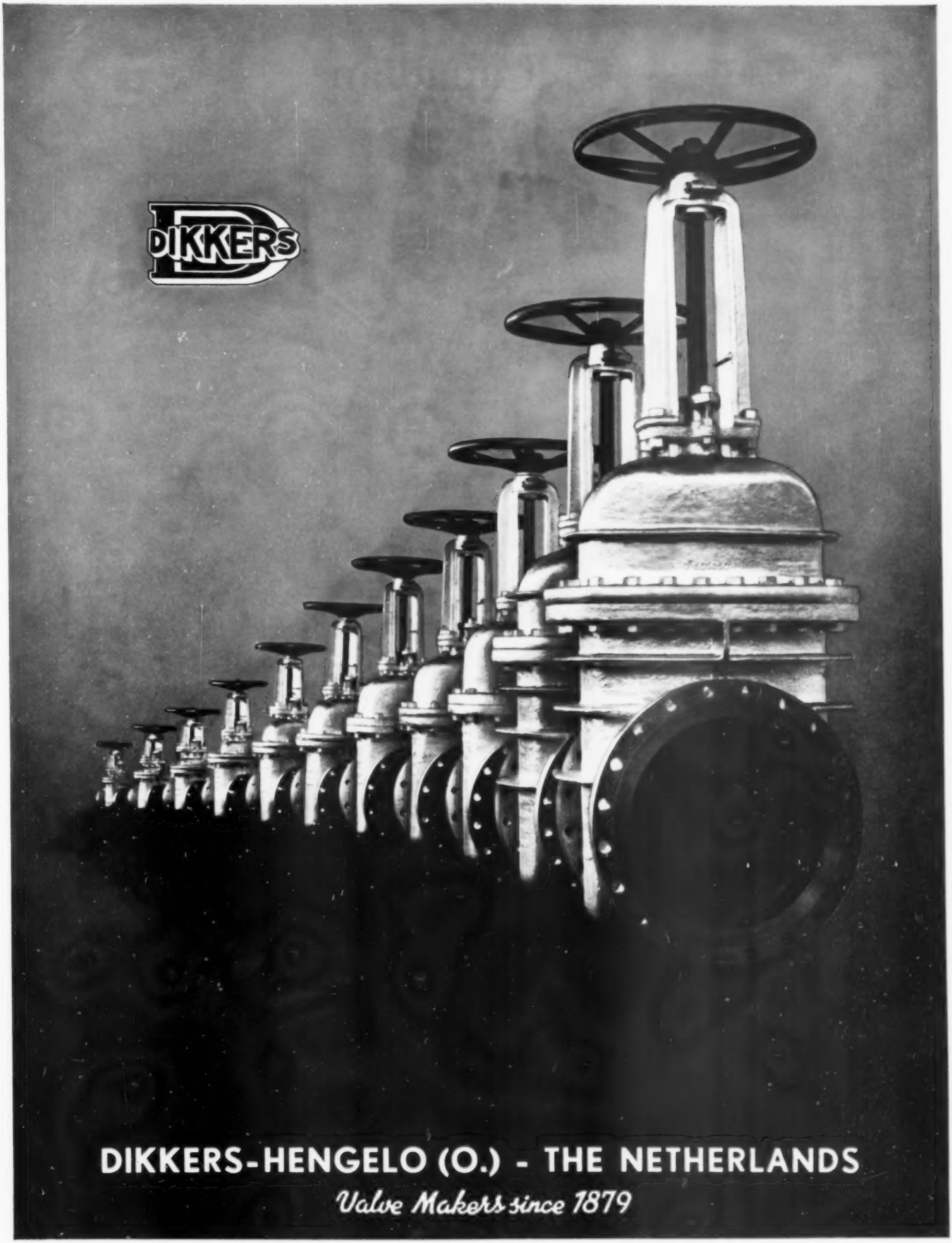
Westspur Pipe Line Co.: In contrast with Pembina, Westspur (which operates out of southeastern Saskatchewan) showed a major gain over its 1957 operations of almost 48%. It serves the growing markets for Saskatchewan crude in eastern Canada and the northern United States. An estimated 80,000 b/d of crude was moved in 1958 (including its parent company, Producers' Pipe Line Co.).

Trans-Prairie Pipe Lines Ltd., also serving Saskatchewan and Manitoba, shared in this good fortune and moved about 32,000 b/d (estimated) during 1958, compared with about 23,600 b/d during 1957. Trans-Prairie put in about 25 miles of additional lines during 1958, and Producers' put in about 100 miles of additional gathering line.

No review of pipelines is complete without a review of natural-gas pipeline construction, which is covered separately under the article entitled "Natural Gas—Canada's Prodigal," in this issue. It reviews the surprising rate of progress in natural-gas development, with 1958 being a banner year with completion of Trans Canada on one side of the country and the first full year of operations for Westcoast Transmission on the other.

While there are no major oil pipelines scheduled to start construction during 1959, there are several projects actively being discussed. The best known is the Montreal pipeline, from Alberta to Montreal, but the recent decrease in the international crude price structure would now appear to make this project even more difficult of achievement than formerly. END





IN CANADA: G. DIKKERS OF CANADA LIMITED, SCARBOROUGH, ONTARIO

Canadian geophysical work drops 15.5% in 1958

FOR the seventh straight year, geological activity in Canada trended downward. The decline in 1958 was 15.5% below 1957 levels, with total seismic work amounting to 1,130 party-months during 1958, compared with 1,338 party-months during 1957.

Seismic work remains the more important in total party-months worked. During 1958, it dropped to 1,065 party-months, from 1,300 in 1957. Alberta always employs the largest number of crews, and during 1958 showed a total of 654 party-months, a sharp decline from the 884 party-months which had been worked in Alberta during 1957. Saskatchewan had 276 party-months during 1958, an increase over the 260 of the previous year. British Columbia, the only province which had shown an increase in 1957, declined in 1958 to a total of only 106 party-months, compared with 149 in 1957. Manitoba and Northwest Territories both had a sharp increase in party-months worked. No seismic activity was carried out in eastern Canada.

Gravity work was done mostly in Ontario, the only eastern province which had any gravity work. The 40 party-months there were the highest of all the Canadian provinces. Alberta declined very sharply, to only 13 party-months in 1958, compared with 32 in 1957. Saskatchewan increased slightly to nine in 1958 from six in 1957.

Contract companies did 70% of the seismic work, 95% of the gravity work, and all of the aeromagnetic work reported in Canada during 1958.

Because aerial magnetic work cannot be expressed in party-months, such information has not been included in the accompanying table. Aerial magnetometer surveys conducted by the petroleum industry during 1958 were reported as follows: 10,480 line-miles in Alberta, 4,085 line-miles in Saskatchewan, 2,461 line-miles in British Columbia, and 35,040 line-miles in Northwest Territories, for a total of 52,066. During 1957, a total of 57,374 line-miles of aerial magnetic work was reported.

There was a significant variation in the usual monthly pattern of geophysical activity in Canada. The accompanying chart shows this fluctuation, which was somewhat greater in 1958 than in previous years, and the losses were not regained during the latter part of the year. END

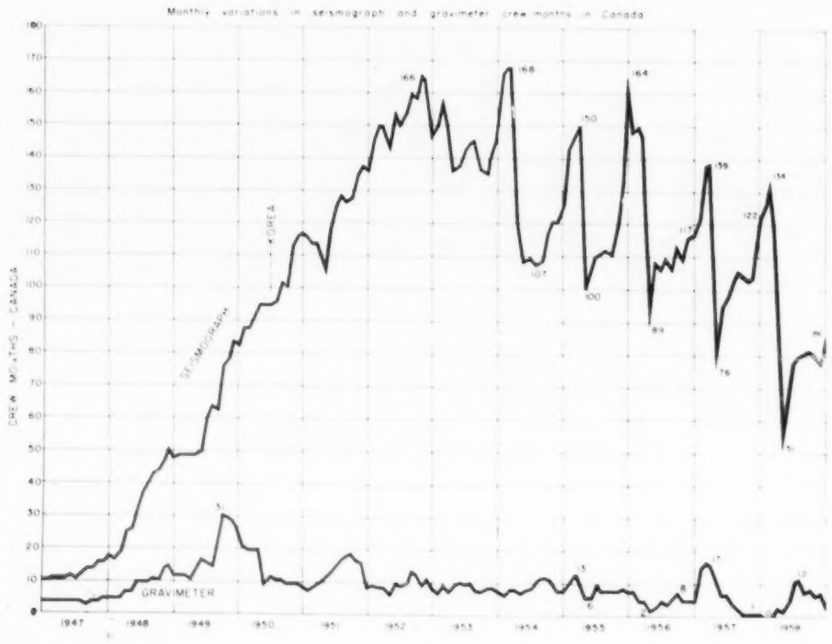
GEOPHYSICAL ACTIVITY BY PARTY-MONTHS—CANADA 1958

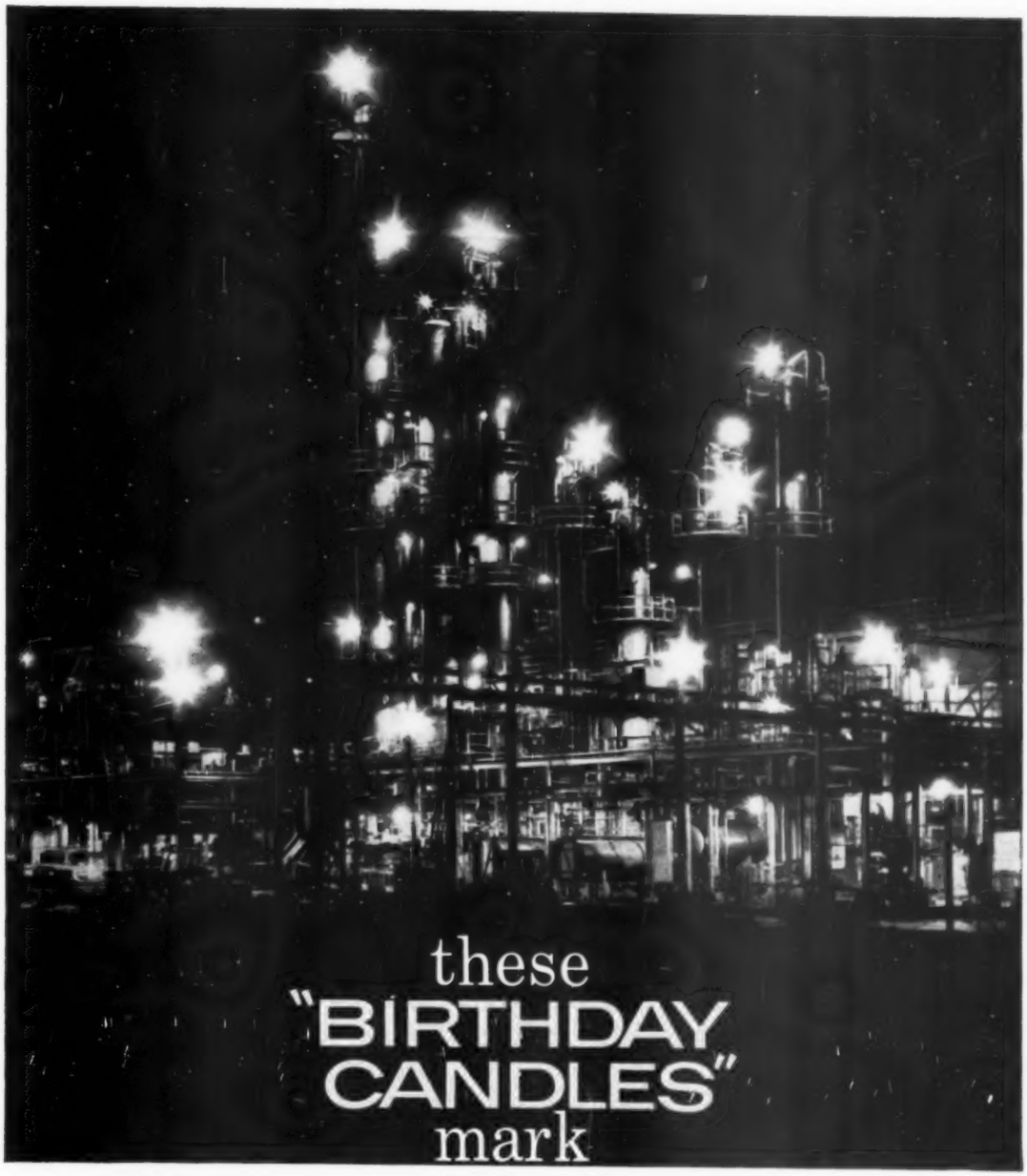
	SEISMIC			GRAVITY			TOTAL		
PROVINCE	1958	1957	1947	1958	1957	1947	1958	1957	1947
Alberta	654	884	155	13	32	41	667	916	203
Saskatchewan	296	260	—	9	6	—	285	266	—
Manitoba	8	3	6	—	—	—	8	3	6
Brit. Colombia	106	149	—	1	—	—	107	149	—
N.W. Territories	21	4	—	2	—	—	23	4	—
Total	1,065	1,300	161	55*	38	41	1,130	1,338	209

* Includes 40 hours of gravity work in Ontario, the only eastern province reporting any geophysical work during 1958.

This tabulation does not include aerial magnetic work, which cannot be expressed in party-months. See accompanying text for same. No magnetic work is included by ground crews, since none was reported for any province during 1957 and 1958.

Source: Party-months for this tabulation and the accompanying chart of geophysical activity were obtained through the courtesy of Homer G. Patrick, chairman, Committee on Geophysical Activity of the Society of Exploration Geophysicists. The chart is reproduced through the courtesy of the editors of Geophysics.





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SHELL OIL COMPANY OF CANADA, LIMITED

Sulfur may move by Foothills pipeline

by David Wood

FACED with a big surplus of byproducts from sour-gas fields, a bold move is being contemplated to move these products by pipeline to markets in the northern USA. In this, the plan follows the Borden commission recommendations which were to the effect that an important consideration to be taken into account in the granting or withholding of an export license should be the extent to which access is afforded to byproducts in such export markets.

At least one part of Henry Borden's recommendations were pleasing to the industry then, for Foothills Products Pipe Line Ltd. has been formed to carry out the project which involves pipeline movement of 100,000 b/d 150,000 b/d of gas byproducts. Capitol costs of this project have been estimated roughly at from $100 million to $150 million.

Pembina Pipe Line Ltd., Calgary, as principal owner of the Foothills firm, has played a leading role in mapping out plans for the giant project which poses an array of technical and marketing challenges.

Gas byproducts production in Alberta is expected to amount to approximately 170,000 b/d once two major gas-export lines go into operation. About 125,000 b/d to 150,000 b/d likely will be considered surplus to Alberta's requirements. Maximum requirements of Alberta will receive first consideration.

Recently James A. Scott, president of Pembina Pipe Line, issued this report on the status of the project:

"During the year, a study which commenced in 1957 relative to the movement by pipeline of natural gas byproducts was continued. These byproducts, which will be produced coincident with natural gas from wells in the foothills area of Alberta, are hydrogen sulfide (from which sulfur can be produced), liquefied petroleum gases (propane and butanes), and condensate. The volumes which will be available when export from Alberta of additional quantities of natural gas is commenced are so large they cannot all be utilized within the province of Alberta, and must find a market elsewhere. A detailed international market study has been undertaken to determine the logical markets for those byproducts which are surplus to the ultimate needs of the province of Alberta.

"It is apparent that most of the surplus must find its outlet at tidewater or at a Great Lakes terminal. In this past year we have examined extensively a number of pipeline alternatives, designed first to service the petrochemical and fuel requirements in the province of Alberta and, second, to provide economic transportation to satisfy other Canadian requirements and export markets.

"It has been determined that pipeline transportation is both technically and economically sound. This Foothills Products pipeline is being actively pursued with a view to the company participating in the ownership and operation of such a pipeline. Progress on this development work at the year-end was encouraging."

Distance of the biggest potential markets for byproducts from Alberta natural gas has underscored the necessity of low-cost pipeline transportation. The Great Lakes area of the USA and Canada are some 1,200 miles distant; and the Pacific Coast markets, at least 700 miles distant. Quoted freight-rate movement on these relatively low-priced products would price them out of the markets. This might also apply even in the case of the most attractive "special" rates, if obtainable. Pipeline movement is generally less than half the freight transportation charges.

It is possible to ship natural-gas liquids in quantity for a rate not exceeding $1\frac{1}{2}$ cents per Imperial gallon to the West Coast and with $\frac{1}{4}$ cent to $\frac{3}{4}$ cent for gathering costs in Alberta itself.

However, hydrocarbons and sulfur must be processed into liquid form and kept in that form in the pipeline under pressure in order to be pipelined. These products then would have to be processed into salable form at the pipeline terminus, the hydrocarbons being separated into various component gases and the liquid hydrogen sulfide converted into dry elemental sulfur.

Among pipeline studies which have been completed to date are these:

Three studies involve movement of gas byproducts to the Pacific Coast. The first is a 10-in. line for liquid hydrogen sulfide; the second, a 12-in. line for liquid hydrocarbons; and the third, a 14-in. line for commingled H_2S and hydrocarbons.

The other three studies pertain to the movement of gas byproducts to markets in the Great Lake area. One study centers on the possibility of a 10-in. liquid H_2S line; another, a 12-in. liquid hydrocarbon line; and the remaining proposal, a 14-in. commingled stream. Preliminary design and engineering have been carried out on all of these possibilities.

According to some studies, it has been shown that a 14-in. line would handle from 75,000 b/d to 160,000 b/d from Pincher Creek in southern Alberta, routed either through Canadian terrain, following the British Columbia provincial highway No. 3, or through the Crowsnest Pass south of the USA and west through less mountainous country. However, alternate routes are being examined also. A line closely paralleling the Trans-Mountain oil pipeline along the Yellowhead Highway to Hope, B.C., is viewed as one possibility which offers numerous advantages.

The possible eastern terminals would be Fort William-Port Arthur via a route similar to the Trans-Canada pipeline. Such a line possibly could be routed into North Dakota and east to Superior, Wis. Many factors are involved in determining the best possible routes, with market considerations being one of the primary concerns in establishing which route should be taken. Announcement of final decisions may not be long in coming. Completion of the detailed national and international marketing study will have decisive impact on planning. In the interim, certain general market considerations are noteworthy: It is known, for example, that the sulfur requirements in B.C. and the Pacific Northwest USA have been estimated authoritatively at about 300,00 tons per year. Offshore markets to the West have been calculated roughly at about one million tons per year. This rough estimate excludes China.

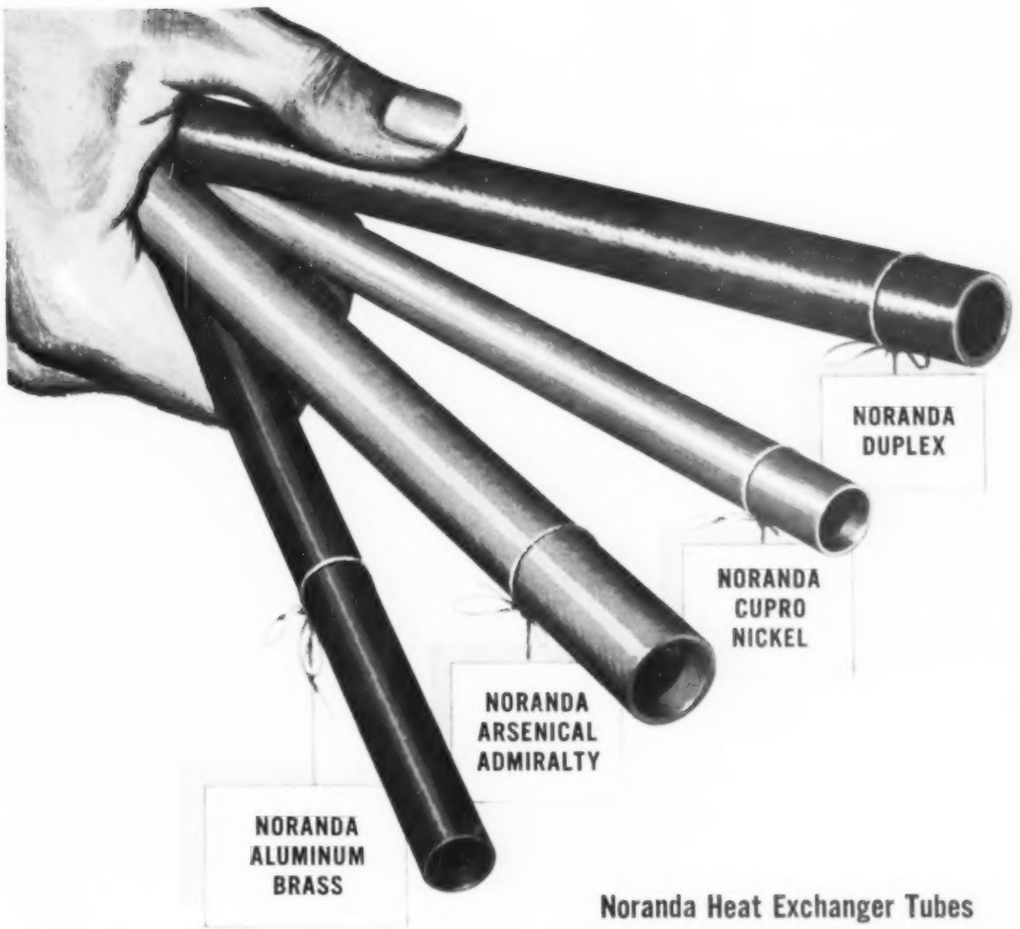
An estimated sulfur market of about 1.5 million tons a year has been mentioned for the general Great Lakes area. At the present time, such markets are served with sulfur produced in the Gulf of Mexico or Louisiana from sulfur domes.

It is essential that sulfur produced as a byproduct of natural gas be priced attractively in relation to that produced in the USA. Pipeline transportation appears to be an essential factor in keeping Canadian sulfur on a competitive footing with the USA product. Regardless, it appears that some method of cooperative marketing will have to be worked out with the leading USA sulfur producers. Preliminary conversations toward this end already have been held.

Markets, both current and developing, exist on both the West Coast and in the Great Lakes regions for light hydrocarbons—natural gasoline, butanes, and propane. Japan is viewed as a potential important market for Canadian propane and butane. Also seen as potential marketing outlets are India, China, and Korea. Further future markets will exist in B.C. for light hydrocarbons which can be processed into a variety of petrochemicals at tidewater.

Larger markets exist currently in the East. Established for some time, the hydrocarbons market in the Mid Continent area is still growing rapidly. It is noted that

(Continued on page 86)



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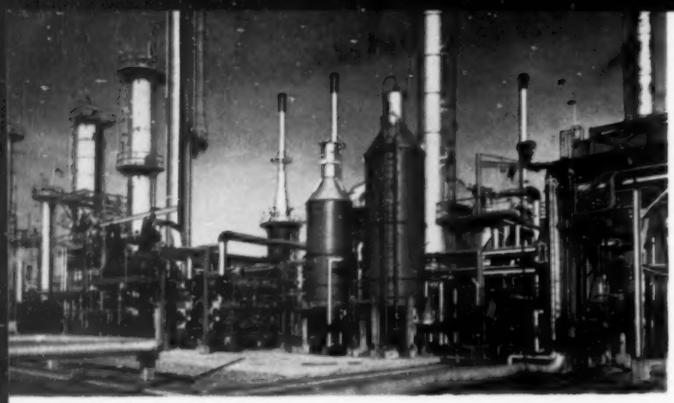

Heat exchangers and heaters of expanded motor-fuel Platformer at Canadian Oils' Sarnia refinery.

Major Canadian Refining Additions Under Way

(Continued from page 56)

built by K. C. Irving Ltd. and Standard Oil Co. of California at St. John, N.B. In recent years Mr. Irving has expanded his operations from one service station to a large distributing system throughout the maritime provinces. He is engaged also in other lines of business. Recently, products sold by Irving Oil have been largely imported, so the new plant will reduce the dominion's dependence on foreign refineries.

The 40,000 b/d Irving refinery being erected by Canadian Bechtel Ltd. is expected to be ready for operations in 1960. Like the BP plant, it will be designed to process Middle East crudes. Completion of the plant will bring refinery capacity in the maritimes to 84,800 b d, which is a little more than current demand.

The naphtha-desulfurizing unit is designed to desulfurize up to 7,200 b sd, consisting of the 380-F EP and lighter fraction off the crude unit. The unit supplies a reformer feed; a light raphtha feed to the straight-run debutanizer of the crude unit; and a jet-fuel product stream.

The reforming unit is designed to process 4,000 b sd of feed. The hydrogen-rich gas produced in the reforming reaction is used in the naphtha- and distillate-desulfurizing units, and the balance sent to the recovery system. Provisions have been made for the introduction of an additional reactor for the onstream regeneration.

The alkylation unit is another "first" for B-A and B.C. Feed stocks are obtained mainly from the catalytic cracking and catalytic reforming units, and comprise liquid gases such as propylene, butylene, and amylenes. With isobutanes added, they are processed with sulfuric acid to produce motor alkylate, with a research octane number of 105 to 108, with addition of 3.6 ml TEL. The unit is designed to produce 1,050 b sd of this blending component.

Imperial has been engaged in a bottleneck removal program at Sarnia to increase crude capacity of that plant to 87,500 b d early this year, an increase of 10,500 b d. Work now in progress will bring crude capacity at this plant up to 94,000 b d before the year is over.

Completion of a Powerformer at Regina this year will provide every Imperial plant with a catalytic reformer. The company also is building at 650 b d alkylation unit at Winnipeg, its first in the west.

Most recent addition to Canada's list of entirely new refineries is the 20,000 b sd plant completed near the end of 1958 by British-American Oil Co. Ltd. at Port Moody, B.C. Completion of this $25.5 million refinery brings crude capacity of British Columbia's six plants to 91,250 b d, which is a year or so ahead of anticipated demand—although the rate of growth on the Pacific Coast has been remarkable in recent years.

The processing plant includes combination crude-topping and vacuum; catalytic cracking; naphtha-desulfurization and catalytic reforming; middle-distillate desulfurization; and alkylation units. A contract for these units was placed with Canadian Kellog Co. Ltd.

The crude-topping and vacuum unit has been designed to process 20,000 b sd of western Canadian crudes. Products from the combined unit include gas, a 380-EP gasoline, kerosine or stove oil, diesel oil, atmospheric and vacuum gas oils, and residuals. The unit is designed to operate independently when adjacent units are shut down.

A straight-run debutanizer is located on the crude and vacuum plot, and has been designed to process light straight-run gasoline from the desulfurizing section of the reforming and desulfurizing unit. By desulfurizing the combined SR gasoline and naptha-overhead fraction, the necessity for treating the gasoline to the required specifications in a separate unit is avoided. In addition, this allows future production of a desulfurized jet-fuel cut.

The Orthoflow "B" catalytic cracking unit is the second of its type installed by B-A—the first having been at Clarkson in 1954. The regenerator is mounted over the reactor, resulting in capital and operating savings. The unit is capable of converting 9,000 b sd of gas-oil blend received from the combination crude-topping and vacuum unit.

The distillate-desulfurization unit is designed to run, in blocked operation, 4,000 b sd of light cycle oil, virgin wide-cut diesel oil, and virgin stove oil—all of which are produced while refining high-sulfur crudes.

Both air and water pollution were studied carefully, and special precautions taken. The flare stack is 249 ft high. For prevention of water pollution, a complete sewage

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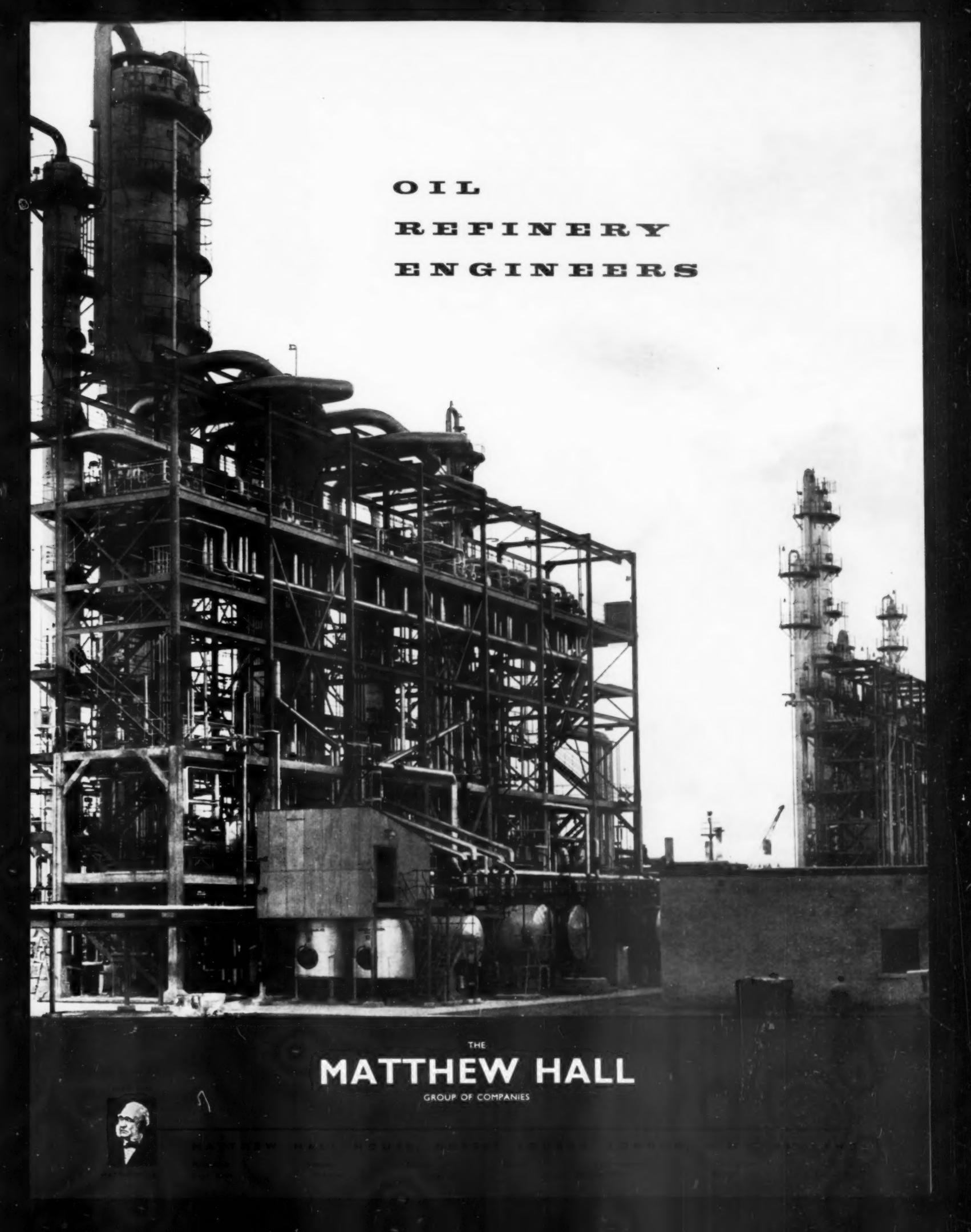
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system has been installed throughout the refinery to gather storm-water as well as more normal effluent streams. A permanent check is made by biological surveys conducted before and since the plant was built.

Crude supply for the plant comes from western Canadian fields through the Trans-Mountain pipeline. Electricity is purchased, and water is from Port Moody city mains. Plant steam is generated in two boilers with an aggregate capacity of 166,500 lb per hour. One boiler is fired with carbon monoxide, obtaining 30% of its fuel from the cat-cracker stack gases.

All tanks in the refinery are tied into an electronic gauging system, the first such complete system installed in Canada. Every tank may be dialed from a central location to obtain quantity and temperature of the product stored.

B-A has been building a distributing system on the west coast for a good many years, having first entered the area in 1935. It now has 550 retail outlets and a considerable industrial and marine business.

Very shortly, construction will begin on British American Oil Co.'s 1959 expansion program at its 55,000 b/d refinery at Clarkson, Ont. It is planned to install additional warehousing and processing facilities at the lubricating-oil and grease plant, and to revamp the catalytic cracking unit.

A continuous blender, new tankage, canning and packaging facilities will result in increased production of high-quality lubricating oils. An integrated order handling system will allow faster delivery, thereby helping to reduce inventories in the field.

The catalytic cracking-unit revamp became necessary due to the additional charge stocks from the crude-processing facilities installed at Clarkson in 1957. Allowance is being made in this work for future increase in crude capacity.

In addition to higher throughput, the modernization will include equipment to recover, for further processing, a greater quantity of gas from the refinery operations.

B-A completed a new catalytic reformer at Moose Jaw last October, and its middle-distillate desulfurizer at Clarkson on April 1 of this year.

First large new plant to be completed in 1958 was the Cities Service 20,000 b/sd Trafalgar refinery at Bronte, Ont., 30 miles west of Toronto. Ground was broken in August 1957, and the completed plant went onstream only a little over a year later.

The refinery is of conventional design—including a crude desalter, topping unit, vacuum unit, UOP fluid cat-cracker, catalytic reformer of the low-pressure regenerative type, light-ends recovery and hydrogen treaters. Because of the relatively high demand for middle distillates in Canada, the plant was particularly designed to minimize motor-fuel production at certain seasons of the year when the optimum product mix makes such a course desirable. All units were designed for maximum flexibility. A rectangular plant layout around a single central control room was selected as permitting future expansion with minimum operations' interference.

The crude-fractionation unit was designed for a pipeline blend of Canadian crudes, with a composite gravity of 37 API; but the major columns are sized for heavier feed stocks. The crude unit produces straight-run gasoline, heavy naphtha, No. 1 distillate, virgin light gas oil, vacuum stock for the catalytic desulfurizer and reformer. Vacuum gas oil is fed to the cat-cracker. The residuum is blended with light cycle oil and decant oil from the cat-cracker to form No. 6 fuel oil.

Partly preheated crude flows to a Petreco Cylectric desalter which reduces the salt content to less than 5 lb per 1,000 bbl. The desalted crude is partly vaporized in a floor-fired horizontal-tube heater designed by Born Engineering Co. Separately fired coils preheat the reduced crude to the vacuum column.

The partly vaporized desalted crude from the fired heater flows to a 42-tray fractionating column operating at about 45 psig. Here virgin light gas oil and all lighter products are separated out. A two-step condensing arrangement for the fractionator overhead vapors permits the use of hot (185 F) reflux, and prevents condensation of water in the top of the fractionator. This reduces corrosion and eliminates the need for costly monel cladding in the upper section of the fractionator. The straight-run gasoline is stabilized before flowing to the product treaters. Stabilizer overhead, consisting principally of butanes, is pumped to the gas-recovery unit. The reduced crude is pumped from the bottom of the fractionator to the vacuum coils of the fired heater.

A three-section stripping column is provided for steam stripping the heavy naphtha, the No. 1 distillate, and the virgin light gas oil. The light naphtha is normally pumped directly to the catalytic desulfurizer, whereas the No. 1 distillate and the virgin light gas-oil streams are pumped through heat exchangers and coolers to the product treaters.

The reduced crude is heated to 750 F in the vacuum coils of the heater, and flashed in the vacuum column at 73 mm Hg. Steam is superheated in convection coils of the heater, and injected into the reduced crude in the heater coils. Two vacuum gas-oil streams are drawn from the vacuum column. These streams, which are circulated through heat exchange for heat recovery, are further cooled and returned to the column. Product gas oil is drawn from each stream and combined before flowing to the catalytic cracker.

The cat-cracker is a fluid-type unit developed and licensed by the Universal Oil Products Co. The reactor is located above the regenerator. A synthetic catalyst gives 75% conversion with a reactor temperature of 925 F. Two-stage cyclones in both the reactor and the regenerator minimize catalyst loss. A centrifugal blower driven by a 3,600-hp induction motor supplies regeneration air. At design feed rates, about 25 million Btu per hour are recovered from the flue gas by genertaing 150-psig steam in a tubular flue-gas cooler. An additional 35 million Btu per hour are recovered as steam by pump-around coolers in the fractionator circuits.

The gas plant consists of five fractionating columns with their accessory equipment, plus a pair of two-stage motor-driven reciprocating compressors. An unusual feature is the use of a separate depropanizer to handle only the overheads from the crude and reformer stabilizers. This keeps the straight-run butane stream separated from the catalytic butane-butylene stream throughout the process.

Heavy naptha from the crude fractionator is catalytically desulfurized and reformed to produce a high-octane gasoline-blending stock. The desulfurizer reactor is of the radial-flow type, internally clad with 12-chrome steel and filled with a cobalt-molybdenum catalyst. Desulfurization takes place at 300 psig and 775 F. Three reforming reactors are provided—two with radial flow and one downflow. All three are internally lined with a high-temperature castable refractory, and are filled with a Sinclair-Baker platinum-bearing catalyst. They operate at 940 F to 990 F and about 450 psig.

Unlike most reforming units, an individual shop-constructed fired heater is located upstream of each reactor. This arrangement is more flexible in operation; and, in this case, is more economical than one or two larger heaters.

The desulfurizer-reformer produces more net hydrogen than is required to fire the desulfurizer and reformer heaters. The excess hydrogen, nearly 5 million standard cubic feet per day, goes to the refinery fuel-gas system.

Plant steam is supplied by three exchangers in the cracking unit and two 50,000-lb-per-hour Foster-Wheeler package boilers. Lake water is zeolite-softened for the boilers. A two mile 3-in. line from Lake Ontario supplies 2,400 gpm of plant water. Intake is buried in the lake bottom 1,500 ft off-shore.

Ten separate systems gather effluent for recovery and, in some instances, return to the lake after treating.

C. F. Braun Co. of Canada Ltd. designed the plant and acted as prime contractor.

A great deal of Canadian refinery construction in the past few years has centered in product improvement rather than in expansion of crude capacity. Motor cars of USA design predominate on the roads, and these require high-octane motor fuels. so pressure has been strong to increase octane numbers. This has been accomplished thus far by almost universal adoption of catalytic cracking and reforming, and catalytic polymerization. Within the past year, alkylation has begun to appear in some plants. No pentane isomerization has been undertaken. Since most plants now are in balance, it appears likely that future expansion will take the form of new installations embracing all or most of the conventional processing steps. END

McCullough Magna-Tector is the key tool in stuck pipe recovery. It tells *exactly* where pipe is stuck and accurately locates the lowest free point from which it may be recovered—all this in a matter of minutes after the Magna-Tector is run in the well.

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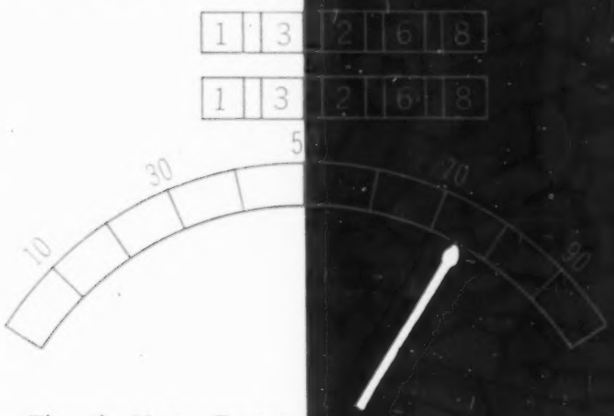

Thus the Magna-Tector paves the way for immediate recovery of *all* free pipe and minimizes the fishing job for remaining stuck sections. It is equally effective in drill pipe, drill collars, tubing or casing.

After the lowest free point has been determined, actual free pipe recovery is accomplished by a McCullough String Shot Back-off, Chemical Tubing Cutter or Jet Casing Cutter.

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Canada's Exploration—1958

(Continued from page 65)

until an adequate sulfur market is found probably will not be produced. The Panther River well was drilled on a resumably folded and faulted foothills structure with sections repeated, and is unique because the productive Devonian zone lies above the younger Mississippian pay.

A second Devonian foothills gas strike was made by the Texaco Castle River B-6-17-6-2 (Lsd. 6-17-5-2 W.5) well, in the Waterton-Castle River field, which was originally only a Mississippian gas field.

In general, deep Devonian reef prospects in the western Alberta foothills gas exploration, and the search for Slave Point and "Granite Wash" oil accumulations in northwestern Alberta, held the spotlight for 1958, and should continue in the present year.

Saskatchewan: There were 275 exploratory completions in Saskatchewan in 1958, a decrease of 25.5% from the previous year's total of 345. Forty-seven discoveries were recorded, consisting of 42 oil discoveries and five gas strikes. These discoveries give a success rate of 18.7% for 1958, as compared with 17% in 1957.

Development drilling decreased by 40% during the past year, as only 532 completions were recorded as compared to 882 in 1957. The decline in development drilling can be attributed mainly to the absence of any recent substantial discoveries. The majority of development drilling took place in Steelman, Weyburn, Carnduff, Midale, and Alameda.

Most of the activity in Saskatchewan was again confined to the southeastern corner of the province, near the erosional edge of the porous Midale beds of the Charles formation and Frobisher-Alida beds of the Mission Canyon formation.

There were no outstanding finds in the province during the past year, but several interesting strikes were made in new areas and formations. Imperial Hummingbird 6-13-2-19 (Lsd. 6-13-2-19 W.2) recorded the first good test of Ordovician oil in Saskatchewan, and was completed as a marginal producer from the Red River sandstone.

Other interesting strikes include a Jurrasic oil discovery north of Wapella, and several finds in the Tilston beds of the Mission Canyon formation north of the main producing area, i.e., beyond the erosional edge of the Midale and Frobisher Alida beds.

Other discoveries were near presently producing areas, along the Mission Canyon and Charles subcrop trends, or in the vicinity of Cretaceous and Jurassic pools in southwestern Saskatchewan. Exploration in 1959 will probably again be concentrated along the Mississippian subcrop, with a trend towards deeper drilling in the center of the basin in the search for new productive zones.

Manitoba: Manitoba showed the greatest decrease in exploratory drilling in 1958; only 16 completions were recorded, which is a decrease of 79%. Only one discovery was recorded, an outpost well at Scallion, for a success rate of 6%.

Development drilling also showed a substantial decrease last year, as exploratory drilling failed to find any new fields. Only 76 completions were recorded in 1958, compared with 150 in 1957, a decrease of 49%. North Virden and Routledge accounted for most of the development drilling.

Northwest Territories and Yukon Territory: Exploratory drilling doubled in the Northwest Territories in 1958 over the previous year. Eight unsuccessful wildcats were drilled, compared with a total of four for 1957. The first well to be drilled in the Yukon, Peel Plateau Exploration Eagle Plains No. 1, was abandoned after reaching the Ordovician.

Eastern Canada Has Active Year: In southwestern Ontario during 1958, both exploratory and development drilling decreased slightly from that of 1957. During the year, 99 exploratory wells and 255 development wells were completed. Although there was a marked decline in activity on land, offshore drilling on Lake Erie increased by more than 75% over the previous year. Natural-gas production increased by 7% over 1957 to 15,500,000 mcf, and oil production increased 24% to 777,200 bbl, an all-time high since the year 1894, when 829,000 bbl were recovered. Six significant discoveries were made in the district during 1958—one each in Kent, Lambton, and Huron Counties, and three offshore in Lake Erie.

In the remainder of eastern Canada (Quebec and the Maritime Provinces), activity continued at a high level. Eighteen exploratory wells were completed, a decrease in number from 27 in 1957; but total drilled footage was up slightly over the year. There was a marked shift in locus of exploratory activity from Quebec to the Maritime Provinces, particularly Prince Edward Island, but no oil or gas discoveries.

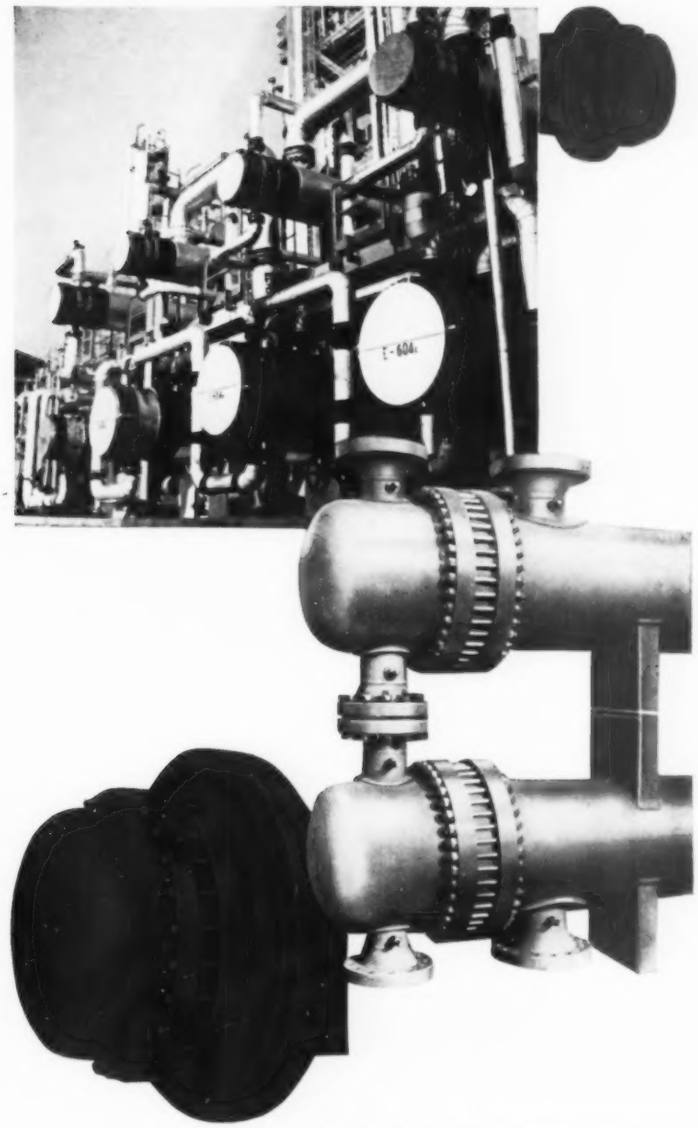
Sulfur by Pipeline

(Continued from page 80)

sizable markets in the Chicago and St. Paul areas already are being supplied by products pipeline from Texas and Oklahoma. Availability of underground storage in the Great Lakes area and salt beds in certain sections of Alberta would help quite a lot in leveling out pipeline load factors.

An extensive products gathering system would have to be constructed in view of the concentration of natural-gas liquids in isolated locations in Alberta. This gathering system would be used not only to gather byproducts from various parts of the province for delivery to export outlet, but it would be used also for wide distribution of the products throughout Alberta.

In that a products pipeline raises specialized problems from a standpoint of the danger of corrosion—a danger greater than in the case of crude-oil or clean-gas transmission—particular attention has been concentrated on this matter. To overcome the corrosion problem associated with movement of hydrogen sulfide the product would be dehydrated (since dry H_2S is not corrosive) in the field and then moved under pressure in a liquid form. In any transportation system involving movement of this product, safety must reign as an all-important consideration. Seriously under consideration is the use of a plastic-coated steel pipe for the proposed pipeline system. It is felt this choice would reduce even further the danger of corrosion. END



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Natural Gas—Canada's Prodigal

(Continued from page 51)

and cities and towns as far south as Red Deer. Northwestern Utilities has announced a budget for 1959 extensions of $4,800,090. Most of this will be used in extending gas service to communities not previously served.

Both companies are feeling the pinch of increased costs, and have applied for rate increases and considerable political capital has been raised to hold the price of gas down—with some harsh words in the papers.

A hearing before the Alberta Board of Public Utilities Commissioners initiated by Canadian Western Natural Gas, December 13, 1957, started May 13, 1958, and concluded October 10, 1958. On March 6, 1959, the board handed down a decision allowing rate of return of 7.75% on a depreciated original cost mid-year rate base. This is instead of 7.5% previously in force. The company had asked for 8.5%, and the city of Calgary had argued for 7%. Preliminary reports suggest this may mean an increase in consumer rates of 13% or 14%, but the exact amount will not be known until a new rate schedule has been submitted and approved. There had been a transitional deficiency in earnings between the time of application and the time on which the decision was announced.

Average Alberta gas consumption in December 1958 was 455,000 mcf per day.

Proposed Outlets for Alberta Gas: Westcoast Transmission has proposed exporting gas from Savanna Creek and from the Calgary field, both of which are high in hydrogen sulfide, and would require plants for fixing elemental sulfur and consequently would almost certainly need a delivery factor close to 100%. Residue gas prepared for pipeline transmission would go to the San Francisco area, being purchased at the B.C.-Idaho boundary by an American company.

Alberta and Southern has made contracts to purchase gas from numerous potential producers all the way from Waterton to Berland River (see F.g. 1, proposed construction). These contracts are, of course, conditional on permission to export.

Both Westcoast and Alberta and Southern applied to the Alberta Conservation Board for export permits. Initial moves were to build separate lines from Crowsnest at the Alberta-B.C. border to Kingsgate at the B.C.-Idaho border, but the two companies later decided to build a single line, and to divide the gas at or beyond Kingsgate. Early applications were rejected owing to lack of adequate contracted supplies, but the applicants were told they could reopen the matter when they could show contracts for enough gas to meet their proposed export, and a hearing is scheduled shortly.

Activity by proposed exporters in tying up reserves has doubtless hampered Trans Canada in contracting for gas to be exported at Emerson, but so many gas discoveries have lain dormant over a long period of years that potential producing companies have become impatient and look for a firm outlet for an asset which needs a market. Trans Canada was initially granted the right to export from specified fields, and did not go outside those fields for contracts. Had it done so, the situation might be different now, but the problem of gas export has been so complicated by political interference that Trans Canada can hardly be blamed for past actions in avoiding contracts which might not be fulfilled.

A recommendation by the Conservation Board was tabled in the Alberta legislature on March 23 to the effect that Alberta and Southern be allowed to export 2.3 trillion cubic feet and Westcoast 0.8 trillion. The two companies had asked, respectively, for authority to export 4.2 and 1 trillion cubic feet. They showed contracts to purchase somewhat more than the amounts recommended, but had contracted to deliver some gas within Alberta. Tabling of the recommendation during a sitting of the legislature permits members to know what is going on, and does not in itself guarantee the export will be authorized—although past experience suggests the board's recommendations will be followed.

One of the political arguments put forward by the city of Calgary is that Calgary consumers should not have to pay for transmission of gas from a distance when there are supplies near at hand, but there has been no move made by Calgary to purchase reserves close at hand. A concession was made by Westcoast, which has contracted with Canadian Western to supply gas from the Calgary field for peak loads. This, again, is conditional on export to make a plant for sulfur recovery economic.

Meanwhile, the growth in population of Calgary has made new supplies imperative, and in 1958 a line was laid from Calgary to the Carbon field, about 10 miles west of Drumheller. This is a field small in area and in total reserves (around 30 billion cubic feet) but having high deliverability and suitable for storage of off-peak gas.

Price of Gas: When Trans Canada started making contracts to purchase, it offered 10¢ per mcf for gas at field gates with escalation of ¼¢ per year to a maximum of 15¾¢. The gas was to be processed to Trans Canada specifications involving low dew point, removal of liquefiable hydrocarbons, and at line pressure which in some cases would require initial compression and in all cases eventual compression. Operators of wells would have to lay gathering lines. The initial price offered was not sufficiently attractive, and Trans Canada had to raise the price in a number of fields to 13¼¢, with escalation of ¼¢ per year to a maximum of 18¾¢.

Consumer prices in Calgary are remarkably low, and the average householder gets gas for around 33¢, which is cheaper than coal on a Btu basis. For some years the bulk of Calgary's gas came from Turner Valley. A decision by the Alberta Natural Gas Utilities Board in 1947 set the price at Turner Valley gate at 10¾¢. This was after gathering and processing, and the wellhead price to producers was only 3¾¢. This set a pattern for Jumping Pound, where Shell contracted the same price at the Jumping Pound gate but with a more favorable load factor. Turner Valley operators are now asking for a 13¼¢ price at the Turner Valley gate, and Shell finds its price leaves little or no profit.

Gas in Saskatchewan: The government of Saskatchewan is quite frankly socialist, but it has had to face many facts of business life. Gas is not plentiful, but the government set up the Saskatchewan Power Commission which has, among other things, built transmission lines and distribution systems and has gathered gas from a number of fields in the province to serve centers of population. SPC buys some gas from Trans Canada. Gas is even being gathered in the east fringe of the Medicine Hat field of Alberta, as well as from rather small wells in the extension of that field in Saskatchewan, laying gathering lines, compressing and paying producers 18¢.

Casinghead gas from Steelman oil field in southeastern Saskatchewan is being gathered and processed by private capital, and the processed gas goes to SPC. Deliveries started, November 4, 1958, and the price at Steelman gate is 10¢ per mcf, escalating ¼¢ yearly to a maximum of 15¾¢.

Borden Commission: A Royal Commission on Energy, headed by Mr. Henry Borden, sat for some months early in 1958 and brought in an interim report on October 25. It ran to about 150 pages and took some time for the industry to analyze. Initial reaction on stock-market prices of issues largely concerned with natural gas led to sharp declines, but the issues involved have since recovered.

The report was highly critical of financing of pipelines, and called for an energy board to be set up by the dominion government. No government action has as yet been taken, but the session of parliament which started January 15 is expected to consider the report.

The Canadian Petroleum Assoc. issued a statement which has been added to by the heads of several large companies. All appear to fear that excessive regulation of industry will have a most adverse effect on financing of pipe lines and on exploration. There must be hope for profit on speculative issues if the public is to invest.

The CCF (socialist) government of Saskatchewan supported the Borden report respecting financing of pipelines with the remarks "Investment in pipelines falls into a different class (from exploration and development). The oil or gas to be transported has been discovered and developed. A market can be measured with reasonable accuracy. Therefore, the risk is minimized provided the operations of the lines do not depend on the issuing of an annual permit by any authority." We challenge those remarks. Trans Canada Pipe Lines would not now be functioning had not a bold private

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operator put up big money to hire an appraisal of Alberta gas reserves and to set in motion the processes by which authority could be received to move gas eastward. Similarly, Westcoast's parent, Pacific Petroleums, had to spend prodigal sums, first in developing gas reserves and then in gaining market connections. Both of these gas pipelines can also be compared with the oil pipeline from Edmonton to the Pacific Coast, known as Trans Mountain. In planning it, a number of oil producers undertook to pay deficiencies (if any) in meeting fixed charges and operating expenses. Just now the throughput is disappointingly small. We simply cannot picture any elected government facing the electors after backing either one of the two gas projects just mentioned over the period of time which proved to be necessary and the amount of money it took to make them realities. Had a government backed Trans Mountain, there might now be repercussions because of unexpectedly small throughput. We feel that the socialist view of trying to grab money-making ventures is only comparable to some of the Latin American events of the moment and recent past and, if supported by the government of Canada, would signal a climate unhealthy for capital ventures.

Byproducts: With movement of natural gas from Alberta and northeastern B.C., problems arise respecting byproducts. The early connections to Trans Canada and Westcoast involved dry sweet gas which need only removal of water, but before both systems had gone far, sour wet gas was being used and hydrogen sulfide must be removed and fixed as elemental sulfur. Condensible hydrocarbons require removal, for their presence would hamper piping of gas over long distances. Both sulfur and LPG become important economic byproducts, and some discussion of their marketing is in order.

Propane: In our northern climate, fuel demand is high in winter, and butanes do not vaporize from outdoor tanks in cold weather. For this reason propane is the preferential liquid for fuel in localities not served by natural gas.

Canadian Hydrocarbons organization is probably the largest marketer of propane in western Canada, and probably in all of Canada. They have no plants for recovering LPG, but purchase from a large number of producers in Canada and have imported from the USA. They have no pipelines, and have depended on railway and road-transport tankers for transportation from recovery plants to consumers, but have obtained a charter to construct a pipeline, although no definite plans have been made for its location and construction.

They have joined with British American and Goliad to develop underground storage at Hughenden, Alberta, participating 40% in the venture. B-A participates 40% and Goliad 20%. The storage at Hughenden was to be ready by April, and arrangements have been made with the railway for "in transit" rates from point of origin to point of consumption.

The past winter is the first in the company's history when it has not been necessary to import propane, and during the previous winter some six million gallons were imported.

Service of gas from Nevis field via Alberta Gas Trunk Line this year will increase availability of LPG for markets. This company does not handle butanes. Its contracts to purchase propane vary with locality of origin, ranging from 5¢ to 7½¢ per gal. Retail price also varies with locality and its distance to be hauled. In the fall of 1958 it was able for the first time to make contracts with consumers with a fixed price guaranteed and delivery guaranteed, valid to April 1959. It has been noted that some peddlers of propane have been cutting delivered price by 3¢ or 4¢ per gal, but without guarantee of future deliveries. This is a condition larger wholesalers must live with, but experience indicates that a peddler who starts with one truck and expands it to two or three, while cutting prices, soon finds equipment worn out with no margin for replacement and possible failure to get propane to deliver when supplies are short. Customers wanting propane then switch to a supplier who can contract for delivery at a fixed price.

The company's operations cover the area from Fort William west, including the Peace River country and the Pacific Coast of B.C.

Stewart Petroleums Ltd. is another large distributor of propane in Alberta, with five plants removing LPG from casinghead gas. They have aboveground storage for 192,000 gal of propane, and their maximum monthly output is 300,000 gal.

LPG Producers: Aside from the five small plants of Stewart Petroleums, Goliad Oil & Gas Co. (offices in Calgary) gathers much of the casinghead gas in Pembina oil field, processing it with fractionation to propane, isobutane, normal butane, and natural gasoline. They have surface pressure storage at Breton railhead of about 1,000,000 gal. They have fairly constant recoveries, since oil production is prorated to the market and Pembina allowable production does not vary much. Recoveries are around 45,000 gal per day of propane, 8,000 of isobutane, 27,000 of normal butane—a total of 80,000 gal daily of products needing pressure storage or enough for nearly two weeks' production, and underground storage is expected to be ready by spring at Hughenden, Alberta.

Texaco processes casinghead gas at Bonnie Glen oil field and in the Cynthia area of Pembina. Bonnie Glen has so high an MPR that recoveries fluctuate with total Alberta allowable oil production, while Cynthia allowables are close to the economic allowable and are steady. In February 1959, Bonnie Glen propane recovery was around 27,000 gal daily, and butanes around 14,000; but, when Alberta oil allowables are low, LPG recovery drops to less than half that rate. Some butane goes to British Columbia for use in a gas-distribution system, and some butane has been returned to Wizard Lake oil field where it appears to mix with oil in the reservoir.

Hudson's Bay Oil and Gas Co. has a plant at Cessford. The gas in Cessford is low in LPG content, and the plant product is 12-lb natural gasoline, which goes to the B-A refinery at Edmonton.

Hudson's Bay Oil and Gas has also participated to the extent of 41⅔% in a plant started in 1958 in the Windfall field of West Whitecourt Block, about 110 miles northwest of Edmonton. The plant will cycle gas at about 30 mmcf per day to recover some 2,550 b/d of LPG and return the stripped gas to the reservoir. From the experience gained in the initial installation, the plant may be enlarged to process about 137 mmcf per day, with recovery of about 11,660 b/d when Alberta and Southern is ready to take gas from the field.

Imperial Oil gets a stream of LPG from Turner Valley at its Calgary refinery, and it has an alkylate plant in which B-A owns one-third interest. Butylene from its Edmonton refinery is shipped by tank car to Calgary, and some surplus normal butane is returned to Edmonton where it goes to Canadian Chemical Co. for petrochemical use.

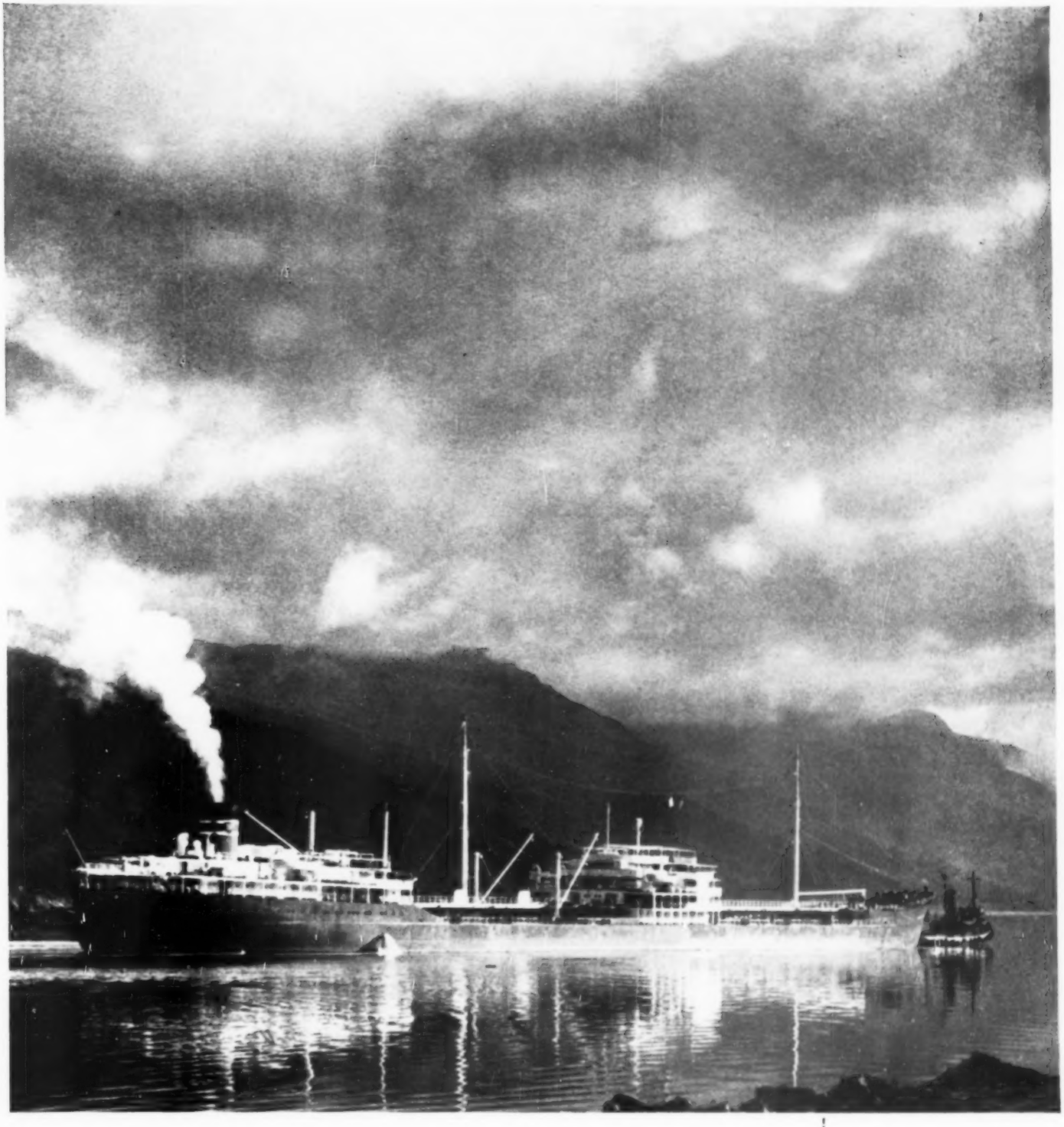
British American has LPG plants at Pincher Creek and Nevis, and its Moose Jaw refinery separates some LPG. In February, Pincer Creek was recovering 10,000 gal per day of propane and 17,000 gal per day of butanes; Nevis 9,000 gal per day propane and 7,000 gal per day butanes. Moose Jaw recovers around 4,000 gal per day propane. Propane goes to local distributors. Butane goes to northwest United States and to British Columbia. Pincher Creek propane has a posted price of 7½¢ per gal; Nevis propane 6½¢ per gal. Butane sells for 3¢ to 5¢ per gal at the various plants. The company participates in the Hughenden storage scheme to 40%.

Steelman Gas has a plant at the Steelmen, Saskatchewan oil field, gathering and processing casinghead gas; and it is being enlarged this year. It has an underground storage operation at Melville. Propane will go from the Steelman plant to Melville by railway tank car during the summer, to be drawn during winter demand; and railway transportation is to be on an "in transit" basis. In February the throughput of Steelman plant was around 23 mmcf per day, and is increasing as lines are extended.

Petrochemicals: Alberta Nitrogen Department of Consolidated Mining and Smelting was the earliest petrochemical plant in Alberta. Built during World War II near Calgary to make explosives, it was sold to CM&S, and makes ammonium nitrate "prills," shot-size pellets; for fertilizer and ships some anhydrous ammonia to CM&S plant in B.C. for use in making ammonium-sulfate fertilizer, the sulfur coming from the roasting of sulfide ores.

Another fertilizer plant at Medicine Hat makes ammonium sulfate.

Both these plants use natural gas as ammonia source, and the Calgary plant makes nitric acid for the process by oxidation of ammonia over a platinum screen.



Loch Long, Scotland. A BP Tanker moves up towards The British Petroleum Company's Finnart Ocean Terminal, where a new jetty capable of accommodating the largest tankers foreseeable came into operation in November, 1958. BP builds now for an expanding future.

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Sulfur for the Medicine Hat plant comes from Pincher Creek by tank car as hot liquid.

Calgary also has an explosives plant owned by Canadian Industries Ltd., taking raw materials from CM&S.

Edmonton has several plants. Polyethylene is produced from fractionation of the gas from Leduc in a plant owned by C.I.L. Canadian Chemical Co. makes cellulose acetate and chemicals, the raw materials being LPG and cellulose brought in from British Columbia.

A plant at Fort Saskatchewan, some 20 miles from Edmonton, makes ammonia for leaching nickel ore brought in from Manitoba, and has a byproduct of ammonium sulfate.

Also at Fort Saskatchewan, Peace River Glass Co. produces fibre glass using natural-gas fuel.

Sulfuric acid is manufactured using sulfur shipped in from plants in southern Alberta.

At Two Hills, some 65 miles east of Edmonton, Western Minerals uses gas produced locally, and salt from a well drilled to the Devonian to produce caustic soda and chlorine by an electrolytic process.

Dow Chemical has proposed a caustic-soda and hydrochloric-acid plant in the Edmonton area.

At Edmonton, Inland Cement uses gas to make cement; and at Exshaw, west of Calgary, Canada Cement Co. also uses gas fuel.

A pipeline of Midwestern Industrial Gas from Alexander field, some 25 miles northwest of Edmonton, to Wabamun feeds a thermal electric power plant of Calgary Power Co.; and North Canadian Oils has built an extension of this line to a plant at Hinton, where gas is used as fuel with an end product of sulfite pulp, the sulfur being shipped from Jumping Pound. Other raw material for this plant comes from timber harvested locally. Calgary Power intends to use strip-mine coal obtained locally in place of gas, at least in part.

Sulfur: John C. Farrington, vice president of Freeport Sulfur Co., submitted an estimate of potential sulfur production in Alberta in a brief to the Conservation Board. He believes facilities existing or under construction in western Canada will yield:

Field	Long Tons Per Year
Jumping Pound	28,000
Turner Valley	11,000
Redwater	5,000
Steelman, Sask.	7,000
Okotoks	88,000
Pincher Creek	270,000
Peace River, B.C.	126,000

In facilities to be constructed:

Nevis	40,000
Homeglen-Rimbey	23,000
Westerose South	19,000
Olds	22,000
Calgary	75,000
Total:	714,000

Mr. Farrington pointed out that, where H_2S is less than 10% of gas content, sulfur is a byproduct and, when greater than 10%, gas is a byproduct. He based his argument on gas valued at 15¢ per mcf and sulfur at $23.50 per long ton; and he argued that export of gas from fields where H_2S is high should not be permitted.

D. P. McDonald, of Westcoast, countered this argument by suggesting that Freeport Sulfur was more interested in marketing Gulf Coast sulfur than in aiding potential gas owners in Alberta.

Other companies in the sulfur business admit that some stockpiling will be necessary, but take a more optimistic view of marketing. They feel that the railways will welcome tonnage in train-load lots of a commodity having relatively low intrinsic value, and will make rates low enough to make its movement economic. Among the suggestions is stockpiling on the seaboard close to loading facilities at Vancouver and close to unloading facilities at points in the

(Continued on page 116)

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and the World Petroleum Congress, New York, (Booths 646 & 695)

Canada's Oil Laws Reviewed

(Continued from page 69)

for the assessment and taxation of oil and gas properties to help pay for the conservation board's operations. The government and the industry both contribute to the cost of the conservation board.

Part VIII is new and deals with unit operations, particularly pooling and unitization. There have been similar provisions in the Province of Saskatchewan Act for some time. These ideas are of extreme importance to the industry.

Part IX deals with records and reports which are kept by the board and information which must be given by industry.

Part X deals with proceedings before the board, and includes appeals. This is new. Originally there was no appeal; now many of its powers in operative sections may be reviewed by the courts; for instance, the necessity of certain schemes, water flooding, pressure maintenance, certain controls of gas lines, questions respecting drilling and production, common-carrier or purchase provisions are restricted in appeal to questions of jurisprudence or law.

Part XI contains provisions of general application. It provides for a number of incidental powers; allows the board to take over wells under certain circumstances; and provides penalties for offenses under the act.

Saskatchewan has a conservation act which, in general, is very similar except the conservation board does not play so important a place in its operations. This will be referred to later.

The British Columbia government has recently named an Oil and Gas Conservation Committee to advise and help the government in conservation matters, and will no doubt develop in its application similar to that in Alberta.

The Gas Resources Preservation Act was passed at a special session in June 1949, called after the government had studied the report of the Dinning Royal Commission on Gas. It was redone in 1956, and what it really does is prohibit the exportation of gas out of the province without a government permit. Originally the board could only grant a permit if gas was surplus on the basis of presently known reserves. An amendment in 1956 allows the board to take into consideration the trend in the growth of reserves in determining what gas is surplus to the present and future needs of the people of the province and, therefore, available for export. Another clause relaxes to some extent the previous measures which may be taken to divert gas for provincial use in the event of an emergency or other circumstances as might arise. Now the board, for the period of the emergency only, may adjust allowable rates of production, and may divert gas intended for industrial use outside the province to such other uses as the board directs. This amendment removes the objections raised by permittees who have difficulty in financing and obtaining Federal Power Commission approval for import of Canadian gas into the United States. The board now believes an applicant under the act is in a good position to obtain contracts for the gas which he wishes to export, subject to the issuance of a permit by the board prior to a certain date.

(2) *Right-of-Entry Arbitration Legislation*—Alberta does not give the operator the right to go on the lands for the purpose of drilling and producing of his oil or gas unless he makes a separate surface contract with the land owner. This may be included in the original lease, provided a separate consideration is shown in the lease for a right to go on the surface. This prohibition is peculiar to Alberta. In practice, however, very few petroleum and natural-gas leases contain this separate right, and it is usual for the operating company to go to the land owner and obtain a surface lease for the express purpose of using surface of the land for his operations. In the event a satisfactory lease cannot be made with the owner of the land, either the company or the owner has a right to go to the board set up under the Right-of-Entry Arbitration Act, called the Arbitration Board. This board, acting under the authority of the act, then determines the amount of land the operator needs and specifies the amount which must be paid for this land. The actual amount which has to be paid in various parts of Alberta is extremely high and way out of line when one considers the actual worth of the surface on ordinary arbitration grounds.

Both British Columbia and Manitoba have copied very closely the Alberta procedures. That of Saskatchewan is somewhat different because in its regulations a formula is set out which should be used by the board based on land-value assessment for tax purposes, and the amount which is arrived at by use is much less than that in Alberta. From a practical point of view, the system of having separate right-of-entry boards assessing value and necessary areas has worked exceptionally well.

(3) *Pipelines*—Each province has its own pipeline act for pipelines completely within the provinces, and these are very similar in their content. They provide that application must be made to the government before actual construction can begin. In the case of two or three applicants, the conservation or similar board may have a hearing to determine which of the applicants should have the right to build a line. The board's recommendation is forwarded to the applicable minister, who makes the final decision.

In Alberta more than one permit can be given in any given area to build an oil line. Gas lines still are maintained on a quasi-franchise system. Subsequent to construction, the pipeline cannot commence its operation until it has another permit to operate the line. This second one is given more or less as a right, provided the regulations and technical necessities have been correctly carried out. In the case of pipelines crossing boundaries of the provinces, they become within the ambit of the jurisdiction of the federal government and, therefore, the federal government pipeline act comes into being, as mentioned previously.

(4) *Miscellaneous*—There are a number of other acts directly affecting industry. Probably the most important are the Mineral Taxation Acts. It is under these acts that taxes are collected for all mineral lands owned by individuals in the province. All mineral lands in the province are subject to one and, in some cases, two mineral taxes. First, there is a general tax on all mineral-owned land, whether it is mineral-bearing or not; and, second, in areas where the lands are oil- or gas-producing. In this second case, they are taxed on the reserves or oil in place. This is done to conform to the British North America Act which prohibits the province from levying indirect taxes which are passed on to the consumer—which would be the case if produced oil were taxed.

There are other restrictions and regulations for the erection of camps, trailers; disposal of brush, débris, and waste during operations by the oil industry in the forest zones of the province; regulations governing the issue of licenses of occupations on public lands; and certain mineral-title clarification acts and the like, and municipal assessment acts which allow for taxing of exploration, drilling, and producing machinery and equipment.

In considering the other provinces of Canada, briefly we find the law as follows:

New Brunswick: Most of the mineral rights in this province have been granted under 99-year lease to one company, New Brunswick Oil Field Ltd. There is, therefore, no petroleum legislation applicable.

Newfoundland: There is no petroleum legislation in this province.

Nova Scotia: Applicable legislation is the Petroleum and Natural Gas Act of 1954 and Regulations governing the Search for and Production of Petroleum and Natural Gas of May 25, 1956. Supervisory agency is the Minister of Mines. Subsoil rights are vested in the province.

Quebec: Governing petroleum legislation is the Quebec Mining Act (1941) with Regulations Governing Prospecting and Drilling Operations for Combustible Gas and Petroleum (October 28, 1931); Regulations Concerning the Carriage and Passage of Water for Mining Purposes (October 18, 1945); and Mineral Exploration Partnerships Act (1941). Recent interest in the province may lead to new laws and regulations being passed. Studies have been made recently of other oil and gas legislation.

Prince Edward Island: The producing phases are governed by the Oil, Natural Gas, and Minerals Act, 1957, as amended; the Regulations Governing the Search for and Production of Oil and Gas, 1958; and Regulations Concerning Geophysical Work, 1957.

Ontario: Governing petroleum legislation is: The Mining Act (1950), and Regulations Governing Boring Permits and Leases for Land North of the Transcontinental

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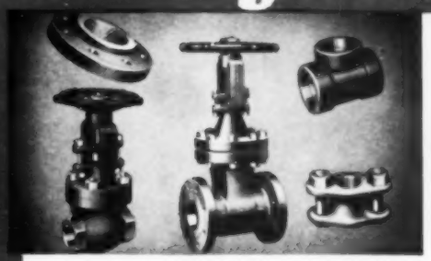

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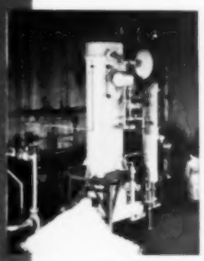

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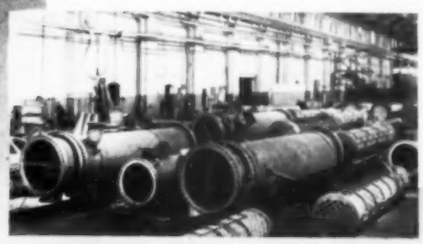

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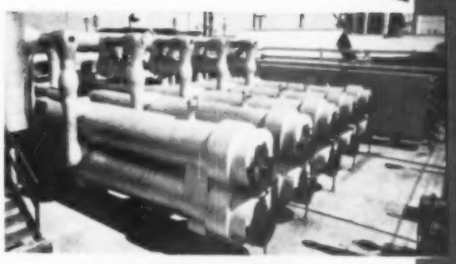

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Railway (August 1954); Regulations Respecting Exploratory Licenses and Leases for Oil and Gas in the Lower Great Lakes; Ontario Fuel Board Act (1954), and Regulations Governing Licenses and Permits, the Drilling and Production of Wells, Distribution of Natural Gas and the Procedure for Applications to the Ontario Fuel Board; Gas and Oil Leases Act (1950); Canada Company's Lands Act (1922); Mining Tax Act (1950); Public Lands Act (1950); Pipe Lines Act, 1958, and Regulations under the Pipe Lines Act.

Again in this province, studies have been made of other legislation with a view of bringing the law more up to date in the light of present conservation practices. Probably we shall see considerable changes in the law of this province.

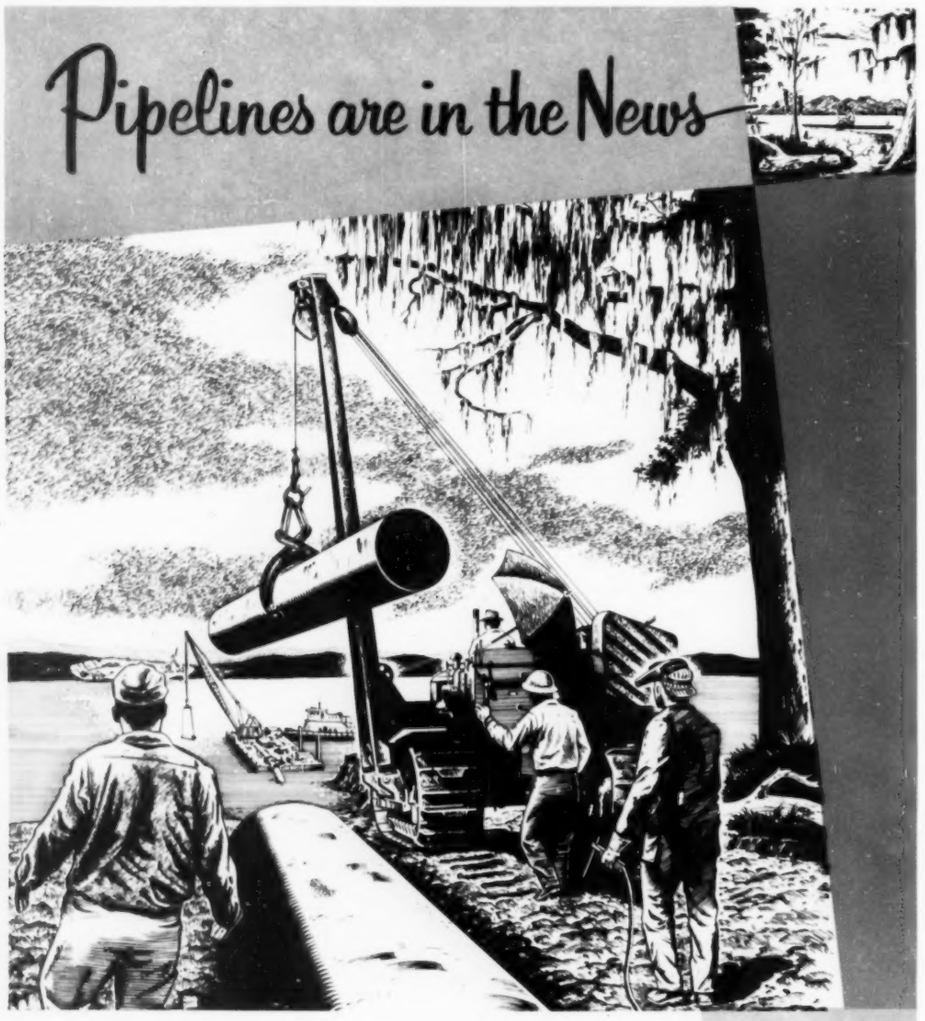
Administration of Petroleum by the Respective Government: Since the Crown has two roles in dealing with the petroleum industry, one as a land owner and the other as a legislator, it is usual to have these fields of the Crown administered by separate units of government. Except in Alberta, where the conservation board is made a body politic and corporate, both phases are directly responsible to the Minister of Mines or his equivalent.

This dual system of administration is well exemplified in Alberta. The disposition of Crown lands comes under the Deputy Minister, and he has a staff to maintain the detail. The drilling and production phases, including proration to market and proration between pools and wells—matters which are not restricted *only* to Crown lands—come under the administration and regulation of the conservation board, a body corporate and a separate legal entity. The board, consisting of these members, has a large staff of engineers, accountants, statisticians, etc., to help it. Industry pays a portion of the costs of maintaining this staff.

In Saskatchewan the dual system also is in operation. One sub-department looks after the disposition of Crown lands, and another after production problems. However, the conservation board is not a separate entity, and is used chiefly as a medium for hearings and reports to the Minister through the Deputy Minister. British Columbia has a conservation committee, and Ontario a fuel board; and these have certain similar powers. Manitoba has not had sufficient production as yet to necessitate a board or separate department to deal with drilling and production, although it does have a director of mines who does a lot of the work which in other provinces falls on the board.

In the Northwest Territories, the Minister of Resources and Development looks after the disposition of land through the Department of Northern Affairs and National Resources. The drilling and production problems come under an oil conservation engineer, who belongs to the same department and who has a small staff in Edmonton, Alberta.

Conclusion: The foregoing outlines in a general way the various statutes and regulations to which the Canadian oil and gas industry is subjected. The writer has not attempted to deal with the income tax, except to say that a depletion allowance is granted, based on 33 1/3% of net profits to operators and 25% net to royalty holders or nonoperator interests. This is to offset permanent loss on a depleting asset. Generally, the income tax is quite high, calling for 45% of all profit in the case of large corporations. END



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D. E. Lewis and A. R. Thompson

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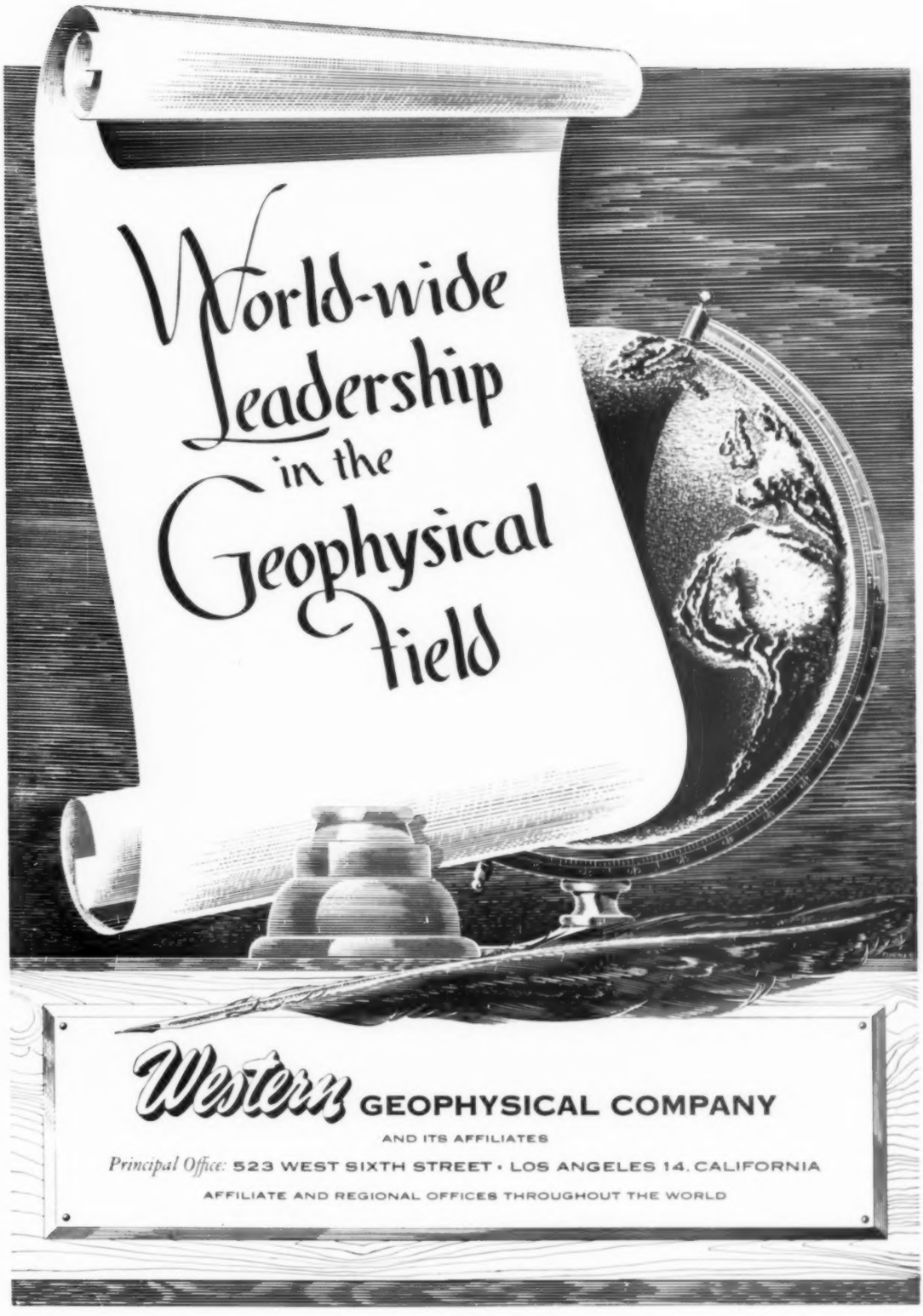
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Knee-deep in northern Canada's snow, a surveyor locates trails for seismic crews (Imperial photo).

Frozen north warms up . . .

Canada's Arctic prospects

by David Bruce Bullock

DAVID BRUCE BULLOCK, petroleum engineer, and a member of the firm of Bullock, Hughes & Tillman Ltd., consulting geologists, was born in 1922 at Taber, Alberta. With a B.Sc. in geology in 1948 and with an M.Sc. in geology in 1950 from the University of Alberta, Mr. Bullock served 2½ years as a pilot in the Royal Canadian Air Force during World War II. In 1952, with Dr. Richard D. Hughes of Vancouver, B.C., he formed the geological consulting firm of Bullock & Hughes, which later became the firm of Bullock, Hughes & Tillman Ltd., with the addition of Jack L. Tillman, of Oklahoma.

Mr. Bullock has been using helicopters for field geology in the northern part of western Canada since the summer of 1950. He made his first trip into the arctic region in the winter of 1952. His firm now owns its own helicopters.

THE arctic regions of Canada's northland have long been known to be areas underlain by sedimentary rocks suitable for oil accumulation, but exploration for oil in this area has been sporadic. With the development of better methods and materials for exploration and an increased demand for large acreages, Canadian oil operators have turned to the arctic in one of the greatest land plays of Canada's oil history. Exploration programs have already covered over 15 million acres of recently acquired oil lands, and current activities in the area suggest that another 15 million acres will be studied in 1958. Results of exploration to date indicate the existence of favorable conditions for the generation and accumulation of hydrocarbons. Though the area is remote, the distance to potential and existing markets could prove to be both practical and economic, depending upon the reserves of the area.

"Good Heavens man, what would you do with oil if you did find it way up there!" was the comment of one and the reaction of many of the prominent oil men in Calgary when asked about the prospects of finding oil in the Canadian arctic. These same men are now directing an intensive exploration program in this same area of Canada's Northland! What is the reason for this paradox? There are several factors. Distance is one significant factor. When the Canadian arctic is viewed from Calgary, the nerve center of Canada's oil industry, it is seen to be a very long 1,500-mile distance; whereas, when it is viewed from tidewater and ready markets along the coast of Alaska, it is seen to be a mere 400-mile distance. Whether or not the "wheels" of Canada's oil industry were moved by a sudden realization that this vast arctic area is near markets, or by the world petroleum picture, or by the fact that there are few other areas left which offer large acreages at low rentals, is not really important. What is important is the fact that a tremendous land play and exploration program have been and are being initiated along this latest frontier.

The Arctic Archipelago: The "frozen assets" of Canada's Arctic Islands are now involved in the hottest land play Canada has ever experienced: In three short weeks, over 72 million acres of potential oil land have been acquired.

The current land rush is the culmination of several years of thinking and planning. Interest in the area was first aroused when word came of the discovery of "salt domes" on the islands. The Geological Survey of Canada, which conducted surveys in the islands during 1955 and subsequent years, later released favorable information concerning the geology of the islands. When finally most of the available land on the mainland had been taken, the industry paused to catch its breath and ponder the question of the Arctic Islands. The answer came unexpectedly at the end of January 1959 with the acquisition of huge blocks of land by several large mining companies headquartered in Toronto. Thirteen nominees, many of whom represent several associates, are currently listed as land holders. With land still available, others may follow.

Several factors have combined to make acreage in the Arctic Islands desirable, not the least of which is a revision in the regulations governing oil exploration in the islands. The federal government, under whose jurisdiction the Arctic Islands fall, is anxious to have the northern areas developed and to establish Canada's sovereignty over the islands. The regulations, which normally provide for the permit holder to deposit rentals of 5¢ per acre for the first 18 months and 25 cents per acre

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– Eugene Holman, Chairman of the Board

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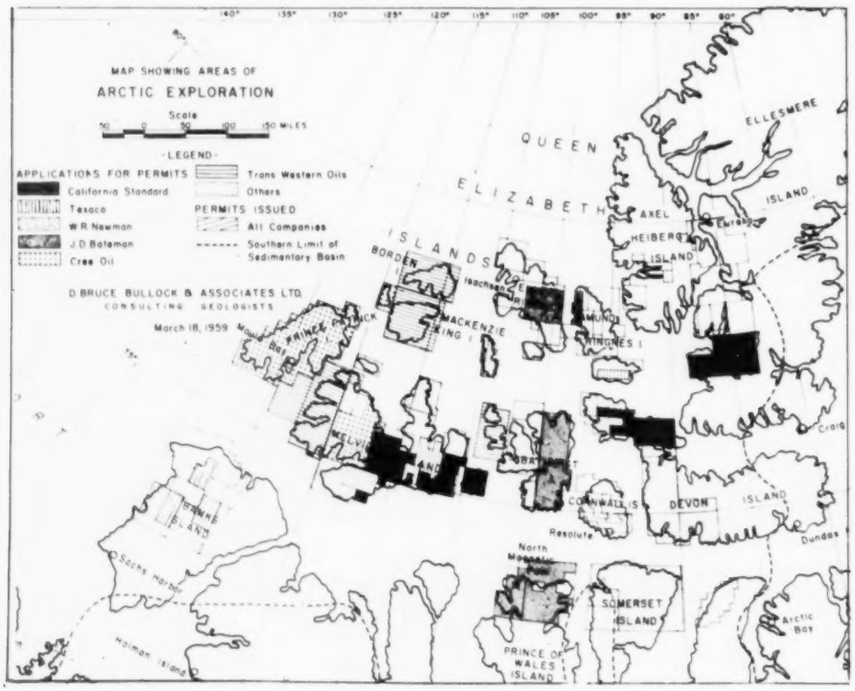
A muskeg-covered pingo, or ice cone, near Tuktoyaktuk on the Arctic coast.

for the second 18 months, are being revised for the area north of 70° latitude to require that 5 cents per acre be deposited for a period of three years and 25 cents per acre for a further three years. Rental deposits are refundable if work to the value of that deposit is done. The effect to the land holder of this change in the regulations is to allow him to hold and explore large blocks of land for a cost of only 5 cents per acre for a period of three years.

Under present world conditions, transportation difficulties would prohibit the economic marketing of oil from the Arctic Islands even if it were available. However, the oil industry feels that during the next three to six years some of these transportation problems may be overcome—perhaps with atomic-powered submarine tankers, or improved plastic pipelines; or by establishment of polar airline refueling depots in the islands. The industry looks on potential oil reserves in the Arctic Islands as insurance against the possible loss of rich oil reserves in areas controlled by unstable governments. In the meantime, because of the preferred land rental rates, companies can afford to hold, and explore, large areas of the islands.

Exploration programs are presently being drafted, and exploration crews mobilized to move into the Arctic Islands. Many new problems will have to be overcome, but men who know the arctic regions have learned to rely on their ingenuity to devise new techniques to meet the challenge.



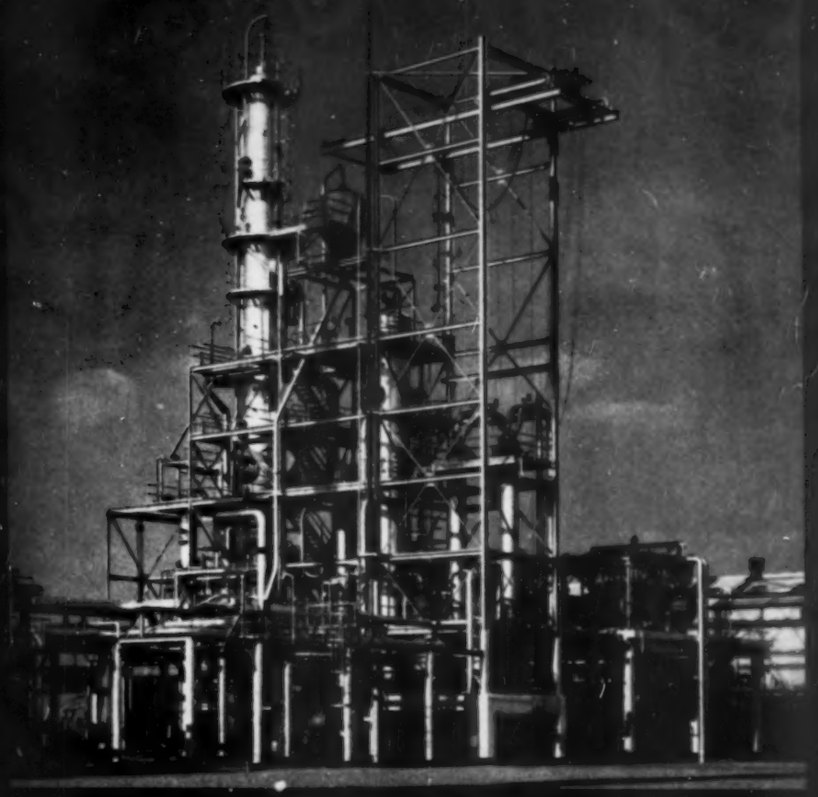
The Canadian arctic region has been studied before by oil men, but active exploration in the area has been in "cold storage" for a number of years. Early geological studies of the Mackenzie basin date back to 1888, and early oil exploration began about 1912. Under pressure of wartime demands, a concentrated search for oil during World War II resulted in the discovery and development of the Norman Wells field, shown on the accompanying map. This exploration program, like those which preceded it, was confined to the Mackenzie River and streams tributary to it. Current activity in the arctic has spread beyond the confines of the Mackenzie River, and has opened up vast virgin areas of potential oil acreage.

The evolution of the Canadian arctic from virtual obscurity to its present position in the limelight of Canadian oil exploration had its beginning in 1952. In that year, the federal government of Canada, under whose jurisdiction the area is administered, offered two 3-million-acre reservations for public tender. Successful bid was tendered by Peel Plateau Exploration Co. of Calgary. In the summer of 1953, that company launched an intensive exploration program which, during the past five years, has included surface geological, photogeological, seismic, and gravity surveys, as well as a drilling program.

Peel Plateau Exploration Co. and the Merrill Petroleum-Sapphire Petroleums group were the only land holders in the area from 1952 until early in 1957. In 1957, when it became known that Peel Plateau Exploration Co. was to drill a well on its Eagle Plains reservation, the land rush began! This land play was led, cautiously at first, by Canso Oil Producers, Standard Oil Co. of California, and Canadian Husky Oil Ltd., with the latter company acquiring nearly two million permit acres. As the season progressed and the well was spudded, the land fever built up to a point reminiscent of the gold rush of 1898 (which indirectly affected this same area). By September 1957, more than 15 million permit acres had been acquired, with most of the major oil companies represented.

Oil exploration in the Canadian arctic has kept pace with, and sometimes overtaken, land acquisition. The oil and gas regulations, designed to encourage exploration, liberally provide for the refund of rental deposits if work requirements are satisfactorily fulfilled. Full advantage is being taken of these regulations and, as a result, an overwhelming amount of valuable information is being gathered. As information accumulates, interest in the area increases and the cycle of land acquisition and exploration begins anew.

The many problems attendant upon exploration in arctic regions have been responsible to a large extent for delaying the area's development. Modern and improved



The photographs show the Hydrodesulphurisation Unit at Shell's Stanlow Refinery and are by courtesy of the Shell Petroleum Co. Ltd.

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methods are overcoming many of these difficulties. Probably the greatest revolution has come in the field of surface geology. Where geologists in years gone by were obliged to travel about on foot or by canoe, their present-day counterparts are whisked across muskegs to the mountain tops by helicopter. By using helicopters, the geologist of today is able to spend 95% of his working time on actual geological studies, whereas with former methods he was only able to spend 15% of his time on actual geological work. The Canadian arctic area lends itself particularly well to the use of helicopters in geological and geophysical work, and most operators in the area have or will be employing them in their exploration programs.

Climatic conditions in the Canadian arctic region control the exploration program's timetable. Just as surface geology must be done during summer months when the rock exposures are free from snow, so must geophysical work be carried out during winter months when the muskeg areas are frozen sufficiently to allow equipment to be moved across them. Summer months in this area are normally dry and warm, though of short duration. Long hours of daylight in the summer (24 hours north of the arctic circle) increase the daily output of exploration crews. Winter months (October to May) are cold and dry; hours of daylight decrease to as little as three north of the arctic circle in December.

Supplies for the arctic areas are brought from "outside" points such as Edmonton and Dawson City. Considerable planning is necessary to insure that an adequate supply is on hand when required. During summer months, supplies are moved from Edmonton to arctic coastal points by rail and river barge. From these points (such as Aklavik and Tuktoyaktuk) the supplies are moved to exploration base camps by float-equipped "bush planes." During winter months, supplies must be moved by tractor train over bulldozed roads to the areas of operation. (The well presently being drilled in the Eagle Plains area is supplied by tractor train from Dawson City—270 miles away—during the winter and serviced by float plane from Dawson City during the summer).

The exploration program of Canadian Husky Oil Ltd. is typical of those carried out by most operators in the area, and its program is reviewed here to assist the reader to a better undersanding of the area, its problems and potentialities. In April 1957, Canadian Husky Oil Ltd. selected 40 permits, totaling nearly two million acres, in the Eagle Plain area of the Yukon Territory. These permits were selected on the basis of existing geological information and available land maps. The acreage was designed to take advantage of the best geological and land positions available at the time of filing. With the acquisition of this acreage an exploration program, in keeping with government regulations, was outlined.

Aerial photographs, air photo mosaics, and topographical maps were purchased from the federal government. A preliminary photogeological study was made of the entire acreage, and the maps prepared from that study were used to assist in the field study of the acreage. Surface geological studies, using a helicopter and a float plane for transportation, were carried out during the months of June, July, August, and part of September. The field party consisted of two senior geologists, two junior geologists, a cook, helicopter pilot and engineer, and the pilot of the float plane. Results of the photogeological and field geological studies were compiled as a basis for recommending future exploration plans for the acreage.

Results of Husky's and other exploration programs indicate that conditions favorable to the generation and accumulation of hydrocarbons exist in the area. As in any "new" area, more work is necessary before commercial reserves of oil or gas can be discovered. At the present rate of activity, the required data should not be long in accumulating. Even as this article is being written, an additional 10 million acres of land has been acquired along the arctic coastal area, and plans are now being formulated for its exploration. To aid in this exploration program, the federal government has announced that it will build roads into the heart of the Canadian arctic's oil territory.

Logical market outlets for oil reserves in the western part of the arctic region would be by pipeline to the coast of Alaska. It is interesting to note that it is about 400 miles by pipeline route from the currently drilling well (Peel Plateau Exploration Eagle Plain No. 1) to the existing Haines-to-Fairbanks products line. Some of the oil operators have estimated that crude oil passed through a pipeline from the area of the Eagle Plains well to tidewater on the Alaskan coast, would compete favorably in Vancouver, B.C., with oil shipped via Trans Mountain Pipelines from the Sturgeon Lake field of northern Alberta. These estimates are based on the premise that large reserves exist in the Eagle Plains area. It would also be expected that existing markets in the Yukon and Alaska might conceivably fall within the economic reach of future crude-oil reserves from Canada's arctic region. END

Surveyor plots shot holes and geophone locations in Northwest Territories of Canada as part of Mobil Oil of Canada Ltd.'s exploratory operations.

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INTERNATIONAL NEWS AND NOTES

Swamp Tractor for Nigeria

A giant crawler-tractor of The Shell-BP Co. of Nigeria will be used to transport equipment and materials into the heart of the Niger delta swamp lands, a terrain similar to muskeg. The tractor, with two amphibious trailers, a 10- and a 28-tonner, is powered by a Leyland 150-hp direct-injection diesel engine with a torque as high as 450 ft-lb. Known as the Albion-Cuthbertson "Water Buffalo," it is made by Albion Motors Ltd., of Scotstoun, Glasgow, and has a tread exerting a pressure of only 1½ psi to 2 psi. The 10-ton trailer carries a powerful capstan winch which picks up the cable and hauls the amphibious train over the most difficult stretches, the speed of the tracks being always synchronized with that of the winch. The vehicle's flat-top deck is also equipped at the front with a hydraulically-operated bulldozer blade, an A-frame at the rear for use as a crane, and an oil-field type winch with a line pull of 70,000 lb.

An unusual feature is an all-welded watertight compartment or chassis enclosing everything except the special tank-type undercarriage, which carries a revolutionary semirubber track capable of flexing freely in every direction. Its smooth under belly also provides an excellent skid surface should the tractor be winching itself out of trouble. A readily removable extension to the body sides of the tractor makes it amphibious for use in deep water, and the trailers have sufficient free board for floating when fully laden.

Magellan Expands in Australia

Magellan Petroleum Corp., formerly Santiago Petroleum, has increased its petroleum concessions in Queensland, Australia, to 25,600,000 acres, covering a new block of 22,400,000 acres in the Tambo area of central Queensland within the Great Artesian Basin. The company is a subsidiary of Pan-Israel Oil Co. Inc. and Israel-Mediterranean Petroleum Inc.

Austrian 1959 Expenditures

Austrian State OeMV is to invest, during 1959, $20.5 million—of which $9.76 million is for construction of Schwechat refinery; $2.7 million for extraction; $961,538 for drilling equipment, etc. Program calls for 164,050 ft to be drilled during 1959 for exploration; 127,073 ft for production; 32,252 ft for development; 31,005 ft for water injection; and 32,810 ft for structure tests.

Persian Gulf Terminal

Basrah Petroleum Co. has announced an early start on the construction of a deep-water terminal at the mouth of the Shatt al Arab in the Persian Gulf, with completion set for 1961. Cost of the terminal, with two 32-in. submarine lines to a new pump house at Pao, 24 miles away, and other improvements, is estimated at $70 million. Expansion will permit rise in oil exports from southern Iraq to 460,000 b/d from previous 240,000 b/d.

Middle East "Take"

Bernardo Flores, the newly appointed Venezuelan minister to Lebanon, predicted Middle East producing companies soon will learn to follow Venezuela's example in increasing to 60% from 50% the tax on oil companies.

USSR Ups Crude Output

USSR crude production, averaging 2,260,000 b/d for 1958, was 15% over 1957. Gas production of 2.9 billion cubic feet daily was 48% over 1957.

1958 Sicilian Crude

Official estimate of 1958 crude production in Sicily was 1,437,488 metric tons (about 28,700 b/d)—of which Ragusa contributed 1,246,955 tons and Gela 186,129 tons. Vittoria accounted for about 4,289 tons; and Noto, 115 tons. Total Sicilian production accounted for 91.4% of all-Italian output; the mainland for the remaining 8.6%.

German Oil Active

Crude-oil production in West Germany came to 4,431,596 tons in 1958, up 11.9%, wth all oil fields sharing in the increase. Production by main areas follows:

	1958 Tons	1957 Tons
North of the Elbe	447,317	442,475
Between Elbe and Weser	1,538,713	1,350,070
Between Weser and Ems	951,526	775,261
West of Ems	1,283,469	1,240,474
Upper Rhine Valley	149,242	118,378
Bavaria	61,329	31,983
Total	4,431,596	3,959,641

Drilling activity rose to 782,274 meters in 1958 from 772,166 meters in 1957. Of the 534 drillings completed last year, 351, or 65.7%, were oil and gas wells.

The main drilling was carried out in the oil fields around Hannover with 228 kilometers; followed by the Weser-Ems area, with 195 kilometers; the Upper Rhine valley, with 121 kilometers; Bavaria, with 95 kilometers; the Emsland, with 83 kilometers; and Holstein-Hamburg, with 54 kilometers.

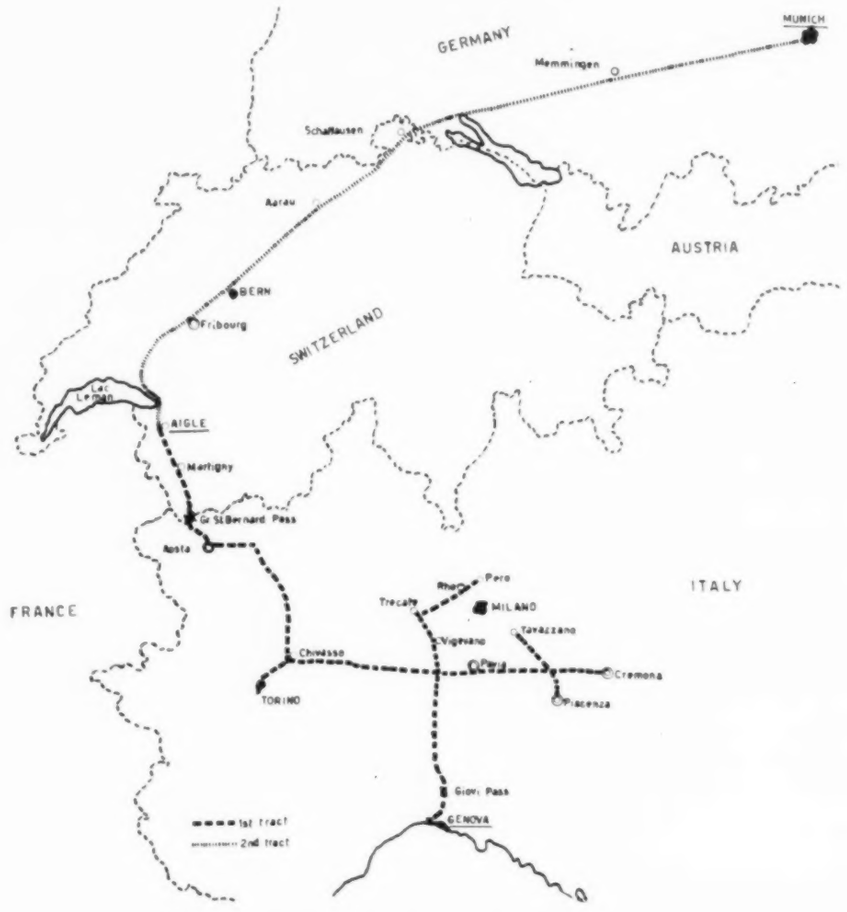
Drilling activity in West Germany follows:

	Meters	Meters
Exploration drilling	222,919	181,150
Extension drilling	137,066	165,323
Production drilling	410,424	411,255
Deviation drilling	11,865	14,436
Total	782,274	772,166

Italo-Swiss PL & Refinery

"O.I." Oleodotti Internazionali SpA has been established in Rome, with SNAM, of ENI group, owning two-thirds of the stock and Ste. Finançière Italo-Suisse the remaining one-third. Enrico Mattei, head of ENI, and the Swiss banker Salvador Ammon have been appointed, respectively, president and vice president. "O.I." intends to build the international Genoa-Aigle pipeline for supplying with crude and fuel oil refineries and thermoelectric power stations in northern Italy and a two-million-ton refinery which will be constructed at Aigle (Valais) near Lake Geneva.

At Lausanne has been set up another company, Italian-"Raffinerie del Rodano" (⅔ Swiss interests and ⅓ Italian interests). The Genoa-Aigle pipeline will later be extended to feed planned refineries in the Munich area, in southern Germany. President of "Raffinerie del Rodano" is Salvador Ammon; and vice-president Ing., Cefis of ENI Group.



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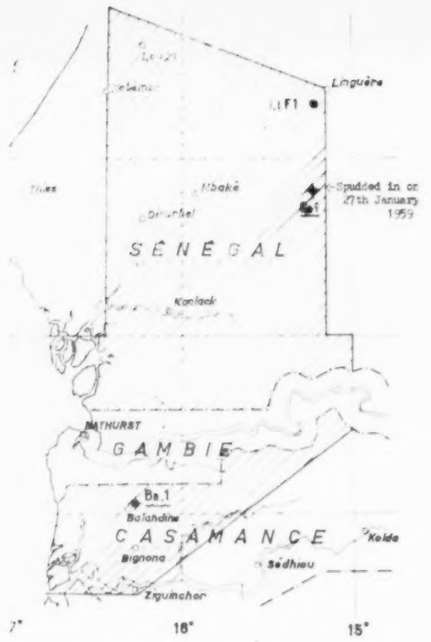


SPS Senegal Operations

Operations by the Societe des Pétroles du Senegal continued during 1958 at a brisk clip. The company summarizes its activities during the past year as follows: Geophysical: *Gravity Meter Survey:* The gravity meter survey carried out during 1957 over parts of the permit area was completed on January 25, 1958. This survey provided a gravimetric cover of the northwestern part of the permit area and also in the Casamance. *Seismic Surveys:* The reflection survey carried out in 1957 was strengthened in January 1958 by a heavy refraction party provided by BP Exploration Co. and in June by a second heavy refraction party.

The reflection party carried out reconnaissance work in the central area until April 15, and then in the Casamance until July 15, 1958, when some profiles were continued across into the Gambia in the area over which BP Exploration Co. has an exploration permit. Finally, this party has been working in the district north of the Gambia.

The two seismic refraction parties carried out large-scale reconnaissance profiles in the northern part of the Senegal permit area. A total of 411 km of reflection profiles were effected during the first nine months of 1958.

Drilling: A National-100 drilling outfit provided by BP Exploration Co. started drilling Balandine No. 1 in the Casamance in January 1958, and had reached a depth of 11,176 ft, in the Middle Cretaceous, by the end of the year. Tests revealed some salt water without oil or gas. A core hole, at Linguere, in the northern part of the permit area, had reached a depth of 3,192.3 ft by the end of the year.

Italian Petrochemical Plant

The Montecatini group will build at Brindisi, Italy's largest petrochemical plant. The plant will treat about 1.3 million tons of crude oil with a production of 700,000 tons of isotactic polypropylene, polythene, polymers for synthetic fabrics, organic solvents, etc. Monecatini has three other petrochemical plants—at Ferrara, Novara, and Terni.

Italian Gas Find

In Ferrandina area, about 30 miles from Matera, Italy, during the drilling of "Ferrandina No. 1" well, natural gas erupted at 20,000 to 25,000 cubic meters per day. Agrip-Mineraria, carrying out the search, decided to continue the prospection in the area to determine the gas field's limits.

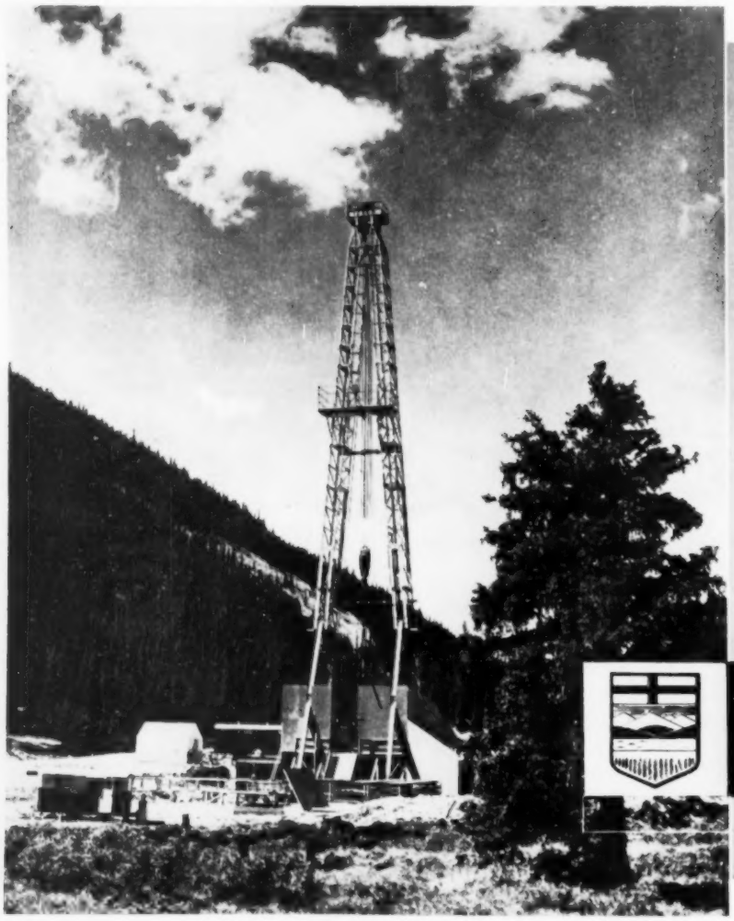
Petrochemicals in Sicily

The petrochemical subsidiary of the "Edison Co." of Milan, Italy, SINCAT, is expanding activity in the petrochemicals field in Sicily. SINCAT activities are presently based mainly on a cracking unit near Siracusa which processes petroleum from the nearby RASIOM refinery at Augusta. SINCAT produces olefins, mainly ethylene and propylene. The greater part of the olefin products will be used by another Edison subsidiary, the CELENE Co., which is erecting a plant at Priolo Gargallo, not far away, to produce olefin derivatives such as ethylene oxide, ethylene glycol, etc. The plant at Priolo will also process potassium salts, which have been recently discovered in substantial amounts in Sicily, to produce compound fertilizers. The output of such fertilizers will be expanded to 350,000 tons per year.

Italian Residual-Fuel Use

For the first time, equilibrium has been reached in the Italian demand and production of residual fuel. Statistics for 1958 indicated that about 7.5 million tons of heavy fuels have been produced by Italian refineries; consumption has been slightly below the above figure. The new situation implies a complete revision of the export policy of the refining industry.

To keep pace with the internal demand of residual fuel, refineries have been obliged to reduce drastically the yields of distillate and, especially, of gasoline. Average yields of the Italian refineries in 1958 were as follows: gasoline 14% (from 18% in 1958); residual fuel 49% (up from 43% in 1955). This switch in the yields of the most important oil products has increased the production of the less profitable product, with a progressive reduction of the overall profits of the industry.



The Province of Alberta has 220,000 square miles underlayed by sedimentary deposits.

For each exploratory well drilled up to December 31st, 1958 there was an average discovery rate of over 900,000 barrels of oil and six billion cubic feet of gas.

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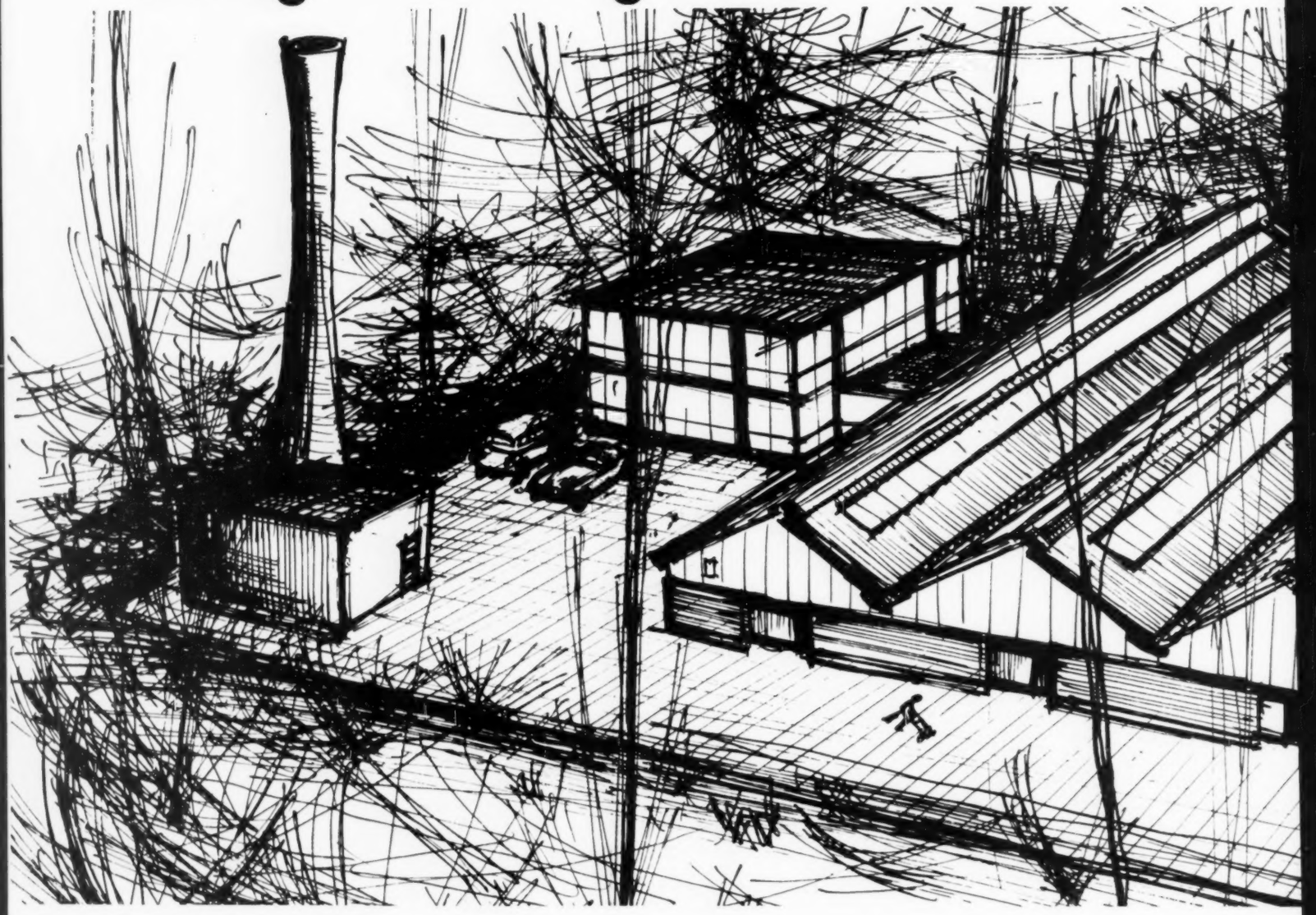

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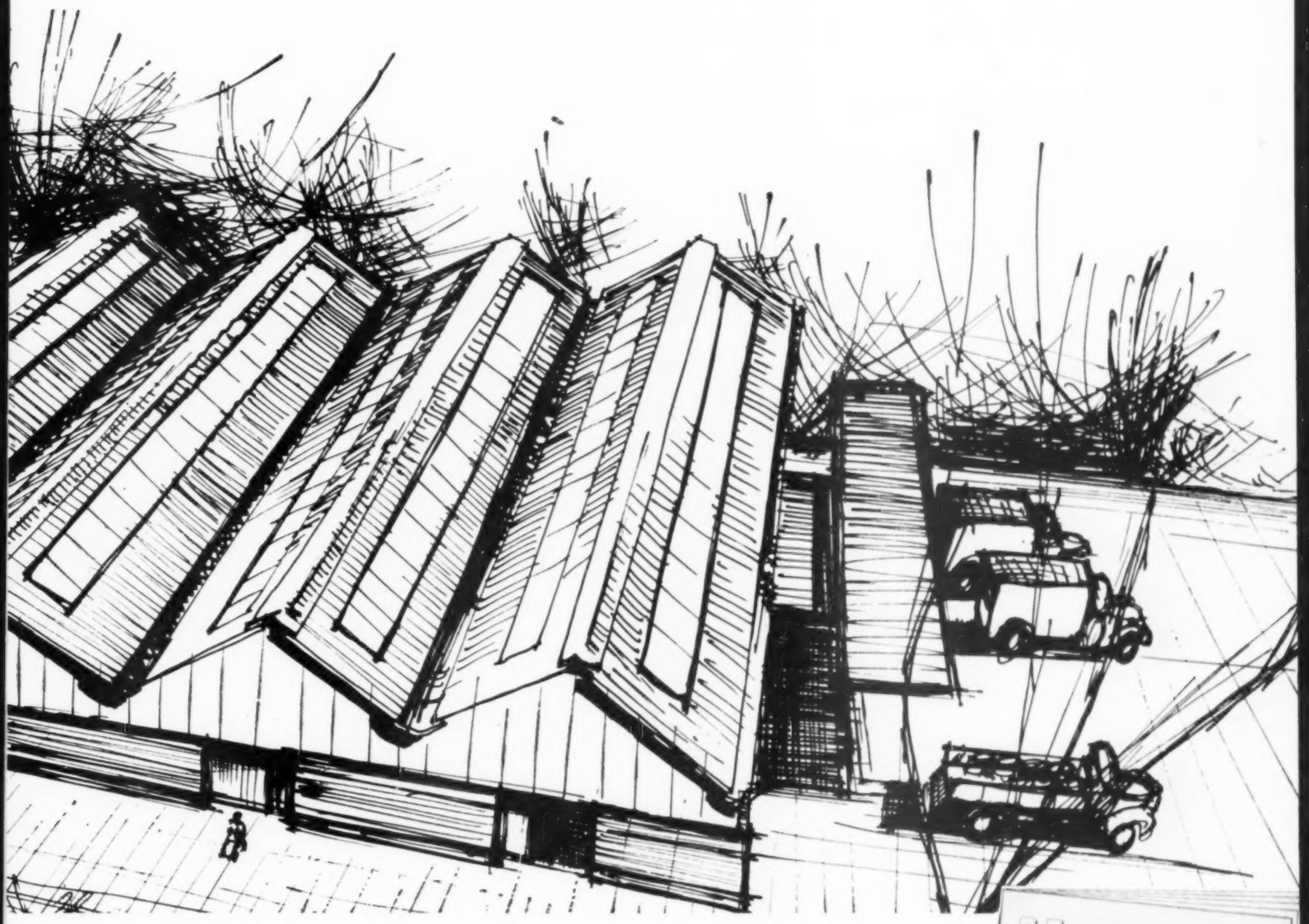

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North Kuwait Facilities

Initial production facilities in north Kuwait are planned for completion mid-1959, it has been announced by Kuwait Oil Co. These facilities will include a collecting and a pump station in the field, and a 30-in. transit line from Raudhatain to the Ahmadi tank-farm area, a distance of some 80 miles. The pipeline construction was reported to be about half-complete towards the end of January, and its capacity will be increased progressively by adding pumping units in North Kuwait as production expands.

Italian-Chinese Relations

Enrico Mattei, ENI president, recently visited Red China to explore possibilities of trade cooperation between the latter and ENI and its associates. He was accompanied by Nuovo Pignone, ENI subsidiary which manufactures oil equipment, and by engineers and economists.

Neutral Zone Capital

The Arabian Oil Co. of Japan plans to increase its capital to about $20 million from the present $10 million figure, preparatory to explorations on its new Neutral Zone offshore holding.

This 50% capital boost was recently approved at meetings of both shareholders and company directors. The step was taken because the prospect of receiving government loans for the project has now been abandoned.

Liberal Oil Law in Italy

The basic petroleum law of Trentino-Alto Adige is more attractive for oil prospecting than the national law of Italy, which does not cover this semi-autonomous territory.

Exploration permits may be up to 50,000 hectares, but no one person may hold more than 150,000 hectares. They run for three years, but may be extended for two successive periods of two years each. A fee of 200 lire per hectare per year is required, and this rate rises to 400 lire for the first two-year extension and to 600 lire for the second extension. The decree granting the permit shall specify the particular obligations required of the permit holder.

Exploitation: The permit holder has the right to convert to a concession if he has found oil or gas. A concession is for 20 to 30 years, and may be extended for successive periods of up to 15 years.

Exploitation fee is 1,500 lire a year for each hectare in the concession area. Annual royalty, in kind or cash or part of each, ranges from 2.5% of the entire production up to four tons per well per day. Natural gas pays the same royalty, assuming one ton of oil the equivalent of 1,200 cubic meters of gas.

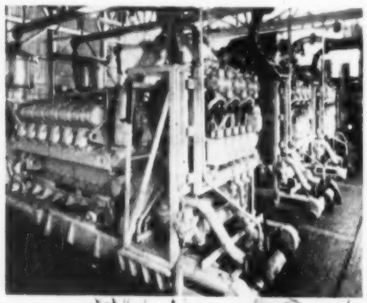
Mideast PL Deliveries Up

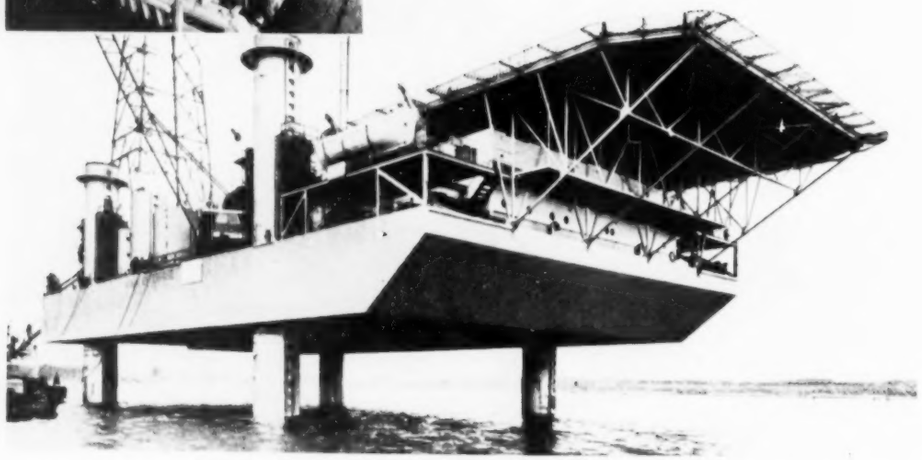
The Trans-Arabian Pipe Line Co. in the Middle East carried an average of 367,911 b/d during 1958, an increase of 5.8% above 1957 levels, but well below Tapline's new capacity of 450,000 b/d. Deliveries came to 368,046 b/d, slightly higher than receipts from the pipeline, and were to the Medreco refinery (3,546,279 bbl) and to ships (130,791,632 bbl).

Receipts from the lines of the Iraq Petroleum Co. came to 159,420 b/d last year, more than double the 1957 receipts. Deliveries of 158,031 included 2,316,388 bbl to the refinery at Tripoli and 55,364,904 to ships.

for Offshore Drilling in the Persian Gulf

The A.D.M.A. "Enterprise," built by Guttehoffnungshutte Sterkrade A.G. for Abu Dhabi Marine Areas, Ltd., has a National 130 draw-works powered by four Paxman 12RPH 400 s.h.p. Drilpak units (see inset). The drilling equipment was manufactured by Oil Well Engineering Co., Ltd., and is capable of drilling a hole 15,000 feet deep. The 440-volt main electricity supply is obtained from three 220 kw alternators, each driven by a Paxman 12RPH engine.





THE ILLUSTRATION BELOW SHOWS THE "ENTERPRISE" DURING THE TESTING OF THE RETRACTABLE LEGS. (B.P. photograph.)

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J 43

Unusual Tank Construction

Difficult access to cliff on which two 6,250-ton tanks were to be built led to novel construction methods being adopted for BP Australia's new storage installation at Berry's Bay, Sydney Harbor, Australia. The roof framework was completely assembled on the floor of each tank when its walls were 12 ft high. With empty 44-gal drums lashed to this framework, water was pumped into the tank, and the roof plates laid once the framework was afloat. With this floating platform, the contractor was able to weld together the 6-ft-high wall plates, and this procedure was followed in 6-ft stages until the 78-ft-high by 71-ft-diameter tank was completed.

Italy's Record Gas Production

Italian natural-gas production in 1958 reached a new record: 5,181 million cubic meters against 4,994 in 1957, for an increase of 3.7%, which is sharply less than in former years (1957 + 11.8%, 1956 + 23.3%).

The increase in production is due especially to the activity in the first semester (2,633 million cubic meters against 2,496 in the same period of 1957).

In January 1959, 19 million cubic meters per day natural gas were produced by the ENI group, the highest daily production yet reached in Italy.

Iraq Oil Revenues

Record total oil revenues to the government of Iraq during 1958 amounted to £83,423 (about $234.7 million) from IPC and associates. Oil exports during 1958 averaged about 640,000 b/d during 1958.

Dutch Refining Slows Up

Because of slipping consumption, Caltex-Nederland Co. spokesman said Caltex refinery expansion at Pernis, The Netherlands, has been slowed down. National consumption, which rose 6% a year from 1950-57, has risen only 2% in 1958 over 1957.

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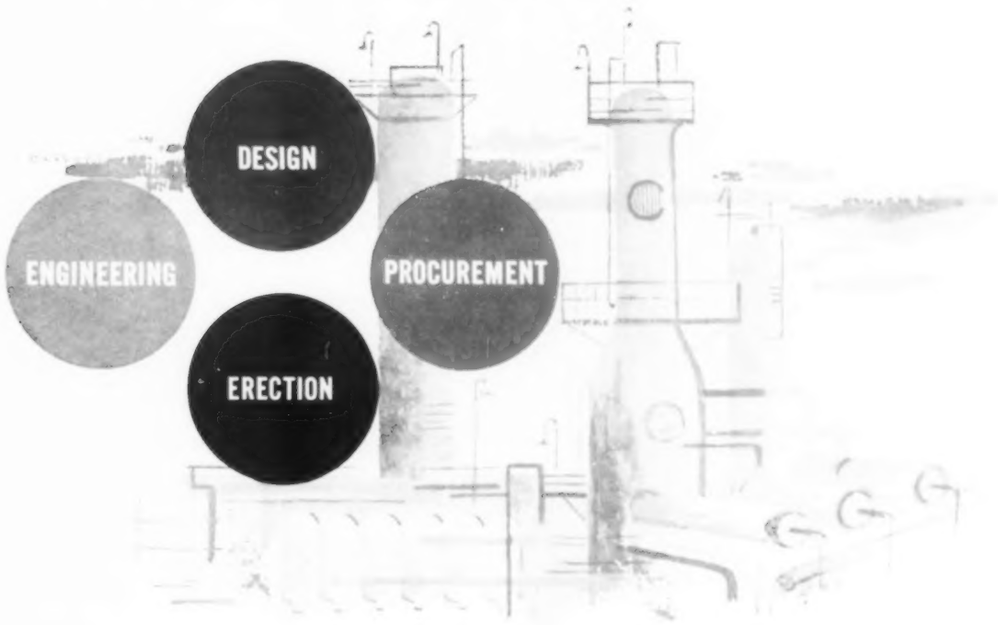

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Headquartered in Caracas, this new company combines the sound Venezuelan construction and business experience of Shevica S.A. with the world-wide technical and engineering "know-how" of Procon. As a first step in its service to Venezuelan industry VICAPROCON is now engaged in studies for various projects relating to the oil and chemical industries.

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WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

New HQ for Shell of Canada

A new $6-million building on Toronto's University Avenue, 13 stories in limestone and granite, houses the head office of Shell Oil Co. of Canada Ltd.; the company's central-division office, from where operations in most of Ontario are directed; and Canadian Shell Ltd., holding company for various Shell interests in the Western Hemisphere. The staff in the Shell Building numbers approximately 600 persons.

The new building was designed to provide the maximum of light and air on all sides. It occupies 40% of the company property, remainder is landscaped area of nearly 60 ft between the building and its neighbor to the north. As a result, the clean, open appearance of University Avenue is maintained.

Provision has been made ultimately to extend the building to 20 stories. All materials used were Canadian, negligible exceptions being those unobtainable in this country.

A unique feature of the Shell Building is the large relief map of Canada (see photo) worked in leather which dominates the Shell Touring Service center to the left of the main entrance. The overall 11-ft x 50-ft mural is believed to be the only one of its kind. The map is accurate in every detail.

An unusual feature is the electrical equipment for the removal of sidewalk snow-and-ice—the first of its type in Toronto. Electrical heating elements embedded in the sidewalk quickly melt any accumulation of snow and ice and, in addition, prevent any further buildup.

Temperatures and humidity are closely controlled by the latest type of air conditioning equipment which provides a minimum of five complete air changes every hour. Four self-operated electrically controlled elevators speed customers and employees to their floors at 600 ft per min. An automatic selector controls the elevator dispatching, insuring fast service during peak periods of traffic. When a fully loaded car has to bypass waiting passengers, it returns for them automatically when empty.

Lighting fixtures, wall colors, desks and chairs all have been carefully selected to provide pleasant working conditions. Facilities include a cafeteria, a medical center, comfortable lounges, and a lending library for all staff in the building.

Time Capsule: In a space behind the bronze plaque commemorating the official opening of the Shell Building is a 12-in. x 13-in. bronze cylinder sealed by Premier Leslie M. Frost as part of the opening ceremonies. Destined to be unsealed a quarter of a century from now, its contents—mainly of a printed nature—will undoubtedly be read with great interest, and perhaps some nostalgia, at that time.

Shell's new $6 million, 13 story building at 505 University Avenue, Toronto.

In addition to copies of the three Toronto daily newspapers and the *Financial Post*, other items in the cylinder include a statement from W. M. V. Ash, president of Shell of Canada, outlining the company's current activities; a photograph of University Avenue as it appears today; building documents; current copies of the company's publications; a selection of 1958 coins and bills; and copies of printed material prepared to mark the opening of the building.

Certainly the petroleum industry can look forward to great advancement in the next couple of decades. The industry is less than 100 years old, and yet within the past generation science has multipled the number of oil products from a half dozen to a thousand.

The "time capsule" gives the company an opportunity to prove the effectiveness of one of its products, Shell Ensis Compound, a rust preventive widely used in industry. The metal cylinder has been coated with the compound, and Shell officials who remove the capsule 25 years from now will have dramatic proof of the accuracy of the company's well-known slogan, "You Can Be Sure of Shell."

Furniture is Functional: Like any family moving into a modern home, Shell officials felt that placing old furniture in a new building would be incongruous. Many months before the "big move" took place, the company shopped carefully, just like any householder, to obtain the furniture which would look best in its new offices. Color, style, durability, and comfort were all considered. The final selections, while not wastefully luxurious, are eye-pleasing and functional.

All general areas are furnished with gray steel desks and matching swivel chairs, blending with light-beige steel partitioning and floor tiles. Even the filing cabinets were refinished to match the overall color scheme.

Executives were given a choice of a number of office suites, and were able to choose the one they liked best. Once again the accent in these offices was on functional rather than "Hollywood-style" furniture often found in executive offices. Drapes and rugs were carefully selected to tie in with the suites decided upon by the various executives. All other employees having private offices have modern, cleanly designed walnut furniture with matching drapes and carpets.

One of the aims of the company was to present an uncluttered appearance in all offices. For example, hat trees have been eliminated from private offices and, in their place neat, specially designed enclosures were built behind the door to hold the occupant's clothing. Executive offices have standard closets for the same purpose. In executive secretarial areas, cupboards have been built to hold files and office supplies—once gain presenting a neat appearance. These cupboards have wooden Pella folding doors which are as attractive as they are functional.

All windows in the building are covered with Morton Sundour curtains rather than Venetian blinds. Easier to keep clean, these curtains also have the advantage of letting light in but, at the same time, reducing the heat of the sun's rays. In addition to making working conditions more comfortable, this feature is also important as far as the operation of the air conditioning system is concerned. By cutting the sun's rays and keeping the air cooler, excessive strain on the air conditioning system is avoided. END

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OIL is where you find it . . . but where do you find it ? Often in out of the way places that demand trucking the drilling equipment to a spot where no man has lived before. Communications ? Take a look at the land—the laying of cable or landlines is impossible. This is where V.H.F. can bridge the gap. The ATE MARCONI Radio Telephone can establish communications where the normal telephone service cannot reach. It provides point to point contact over any type of terrain, and can be powered by a car battery. ATE MARCONI v.h.f. sets in fact, can be used anywhere in the world where maintaining contact is difficult, but *vital!*

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(Continued from page 92)

Far East. Some move has already been made to secure a site at Vancouver.

Sulfur enters so many processes that it has much usefulness, and price-cutting does not increase its use.

Proposals have been made for a pipeline from Alberta to the Pacific Coast, and also to the head of the Great Lakes to carry LPG and hydrogen sulfide. They would need removal of water vapor before entry to the line, and sulfur would be fixed at the terminal and LPG fractionated there also. To date this is only a proposal. It involves high capital cost but low operating and transmission cost and long piping of a lethal poison whose accidental escape could be disastrous. Observers point out that, in absence of water, hydrogen sulfide is not corrosive to steel pipe, so the hazard to life may not be great.

Potash: Potash actually falls outside consideration of natural gas, but exploration in Saskatchewan has been by drilling wells and coring the prairie evaporite of Devonian age. The bulk of the potash used in North America goes into fertilizer, supplementing fertilizers made from natural gas into ammonium sulfate or ammonium nitrate with added ammonium phosphate.

The Potash Co. of America completed a shaft near Saskatoon late in 1958, and potash ore is being mined and processed. The depth of the shaft is around 3,500 ft—and that depth is considered about the maximum for mining an ore which lacks great compressive strength. Saskatchewan has potash over quite a large area, but some known occurrences are as deep as 7,000 ft—and operations are likely to be confined to the deposits at 3,500 ft or shallower. Reserves are known, adequate for some centuries at probable rates of consumption.

END

Planning World Congress

Members of the Secretariat of the Fifth World Petroleum Congress discuss plans for the congress at one of their regular meetings in New York headquarters of the congress (527 Madison Avenue, New York 22, N.Y.). From left to right are James W. Muckell (meeting services); Charles B. Towill (press and public relations); Gordon W. Duncan (assistant general secretary); Miss Fan Cox (hotels and entertainment); Frank C. Cutting (editor-in-chief); Howard R. Tate (meeting facilities and exposition).

The congress has established a technical editing group to review a total of nearly 300 papers as they are received from author, prior to their being sent to the printers for preprinting. The editing group comprises a total of 24 personnel, of whom 10 are working with the editing group on a part-time basis. The publication of the preprints is a considerable undertaking involving the printing of some six million pages of text matter.

Italy's $510 Million in Oil

Official figures from the Italian Ministry of Industry and Commerce concerning internal consumption of oil products are:

Product	Thousands of Metric Tons
Gasoline	1,765
Kerosene	156
Gas and diesel oil	2,124
Residual fuel oil	7,500
Lubricants	183
Bitumens	455
LP Gas	515

Tax on manufacture of mineral oils has brought to the government an overall income of 320 billion lire ($510 million). Income from the same source in 1957 was 239 billion lire.

Austrian Oil Province

Oil shows at 8,038 ft in RAG's well Ubersbach No. 1 indicate existence of oil in Styria province.

Russian Gas Reserves

Crude output in the USRR for 1958 is estimated at 113.5 million tons (about 2,570,000 b/d); it was 98.3 million tons in 1957. Natural Gas Research Inst. estimates gas reserves at 671 to 706 billion cubic feet, 30% to 50% more than in USA.

USSR Ups 1960 Gas Target

Deputy Chief of the Central Gas Production Board of the USSR Didorenko has announced that the production target for 1960 or 40 billion cubic meters (1,412.4 billion cubic feet) of natural and artificial gas will be accomplished one year ahead. Didorenko added that a number of gasoline plants will be built which will make it possible to produce by 1965 about four million tons of gasoline against 60,000 tons at present.

New Papua Permit

Australasian Petroleum Co. has applied for an oil permit for 8,930 square miles in Papua. The application also sought to add 45 square miles to an area only 15 miles from Puri, where oil was struck in November.

Prospect of oil

In the search for oil, no corner of the wilderness escapes today's exploration teams. Their work contributes to the fabulous progress of the Canadian oil industry. Estimates place Canada's oil reserves between 23 and 30 billion barrels by 1980.

An important part of the oil man's team is the Petroleum and Natural Gas Department maintained by The Canadian Bank of Commerce at Calgary. This Department is staffed by men who *know* the oil industry. Their expert knowledge, backed by detailed and complete records of exploration and development, is available in Calgary, or can be obtained for you by any of our branches across Canada.

We invite you to call in and see this Department when you're in Calgary. For maps and other information write to: C. H. Munro, Manager, Petroleum & Natural Gas Department, 309-8th Avenue West, Calgary.

(The Bank does not advise on the merits of oil or mining securities)

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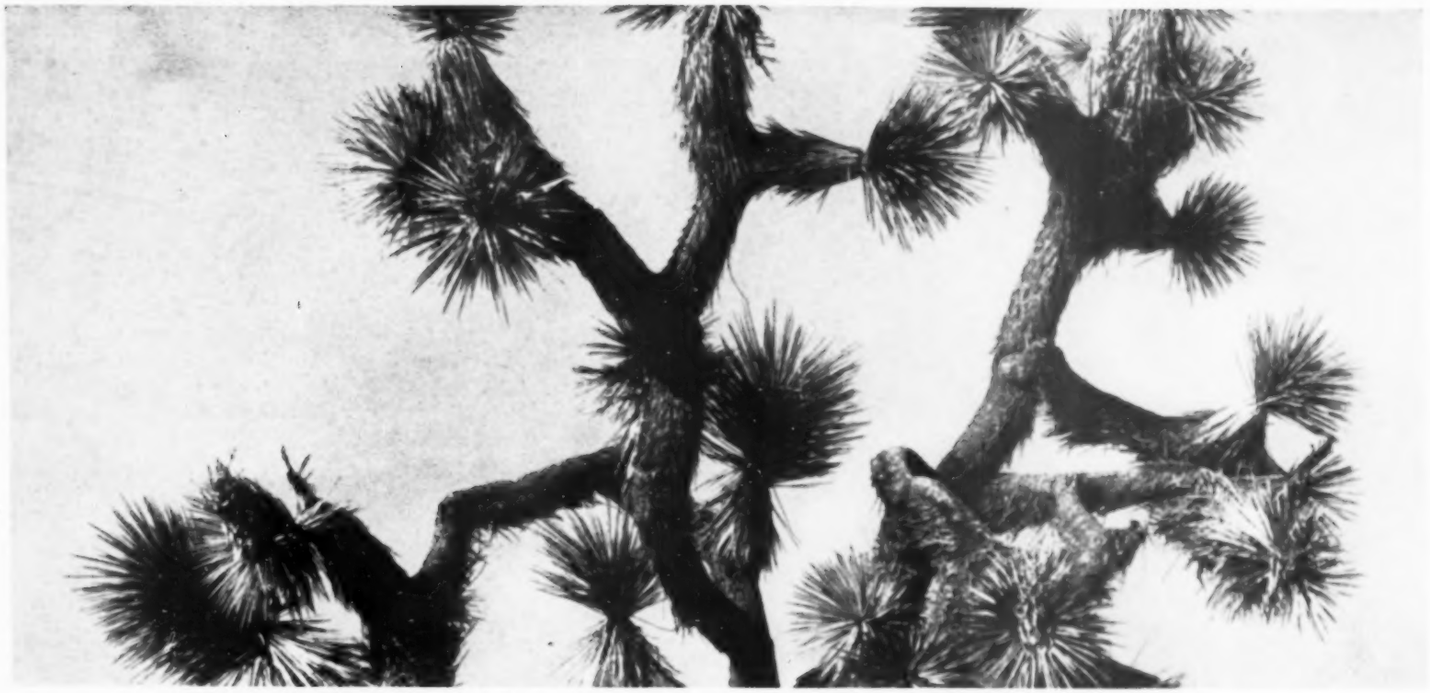


The lonely Joshua tree stands today as the Mojave desert's principal link to the million-year-ago past.

Geophysical and core-drill study of Mojave desert completed

by Quinton Peters[1]

Sunray Mid-Continent Oil Corp. team of geologists and geophysicists survey 75,000 acres in search of minerals and rare earths—not petroleum.

SUNRAY Mid-Continent Oil Corp. recently completed an exploratory survey of California's Mojave desert to test sedimentary deposits in the vast and bleak expanses of this comparatively unexplored plateau. Sunray has leased some 25,000 acres in the Mojave, and is conducting core-drilling operations on an additional 50,000 acres for other interests.

The company's search in the desert embraces a threefold objective: common minerals which may exist in a more easily producible form; rare minerals or clays which do not exist in abundance elsewhere; or unknown minerals. The area is not favorable to the existence of oil or gas deposits.

Sunray geologists believe evaporites and salines of various types could exist in such quantities in the Mojave as to make them economically producible. Such minerals might include beryllium, kyanite, lithia minerals, special types of clays, and such minerals as bastnaesite, monazite, and xenotine. These latter minerals contain rare earth elements such as cerium, which is used in electronics, and lanthanum, didymium, and thorium, which are used in the atomic reactor field.

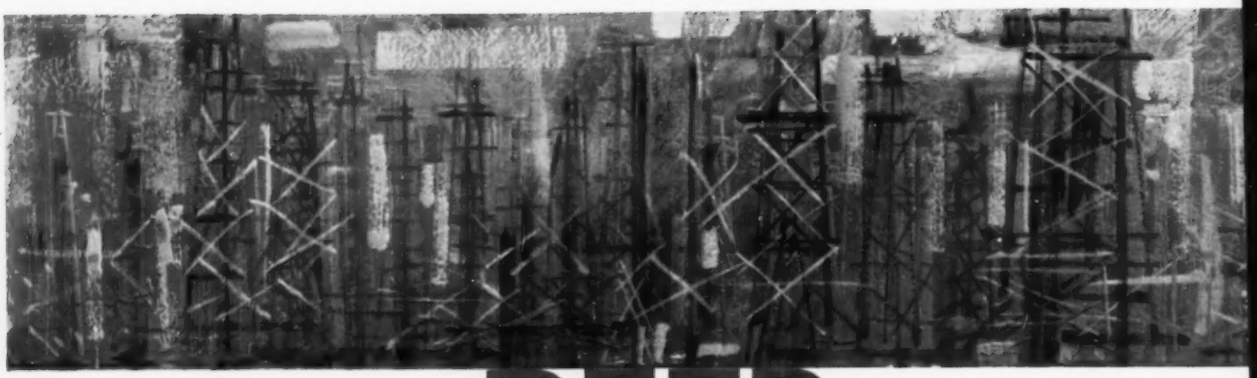
Saline minerals might include trona, hanksite, potassium chloride, and borax, from which boron is produced. Boron received prominence recently for its use as an antiknock additive in gasoline and as a fuel constituent for jet planes and rockets. Sunray officials emphasized, however, that the Mojave program is not restricted to exploration for any particular mineral.

Geophysical and core-drilling activities began in May 1958, but work was halted in July when extreme desert temperatures set in. Work was resumed in October, and continued through February.

Sunray has used four methods for determining sites where it is conducting geologic tests: surface geology, photogeology, geophysics (primarily gravity-meter surveys), and previous core holes and wells (which are comparatively few).

Core tests at varying depths are being made from an especially adapted shot-hole rig. In tailoring the rig to its specific needs,

[1] Sunray Mid-Continent Oil Corp., Tulsa, Okla.



REED *salutes the oil*

1958 ... The first combination teeth-and-insert bit – the Reed COMET

1957 ... YC-3 Air Bits, specially designed insert-type rock bits, set tremendous footage records in air drilling

1954 ... Jet Y Bits with exclusive Flush-Flo return ports greatly increased return area, improving cleaning and hydraulics

1953 ... Reed pioneered the "tensile-impact" test for flash welds; there has never been a field failure in the weld area of a Reed Flash Welded tool joint

1950 ... Twin-Blast series rock bits brought further improvement in bottom-hole cleaning action

1948 ... Reed developed the W. O. tool joint for use on light weight pipe

1948 ... Reed originated the "Hi-Flex" operation to extend fatigue life of drill collar connections

1948 ... Liquid-Blast series rock bits improved cleaning action on cutters and on bottom of hole

1947 ... Reed introduced the "Super" type drill collar with field-replaceable connector

1939 ... Reed introduced the tool joint with cylindrical land and fixed landing shoulder for foolproof application and removal in the field – the Super Shrink-Grip tool joint

1939 ... Reed pioneered the Semi-Internal Flush tool joint, later to be called the Extra Hole tool joint

1937 ... Reed developed the Double Streamline tool joint; the 4½" size was later adopted as the API standard 4" Full Hole tool joint

1936 ... Reed pioneered the Internal Flush tool joint which was to become API standard

1935 ... Reed engineered and designed the tool joint which substantially eliminated last engaged thread failures – the Shrink-Grip tool joint

1934 ... The first cross cutter rock bit with ball thrust bearings

1930 ... The first unitized rock bit

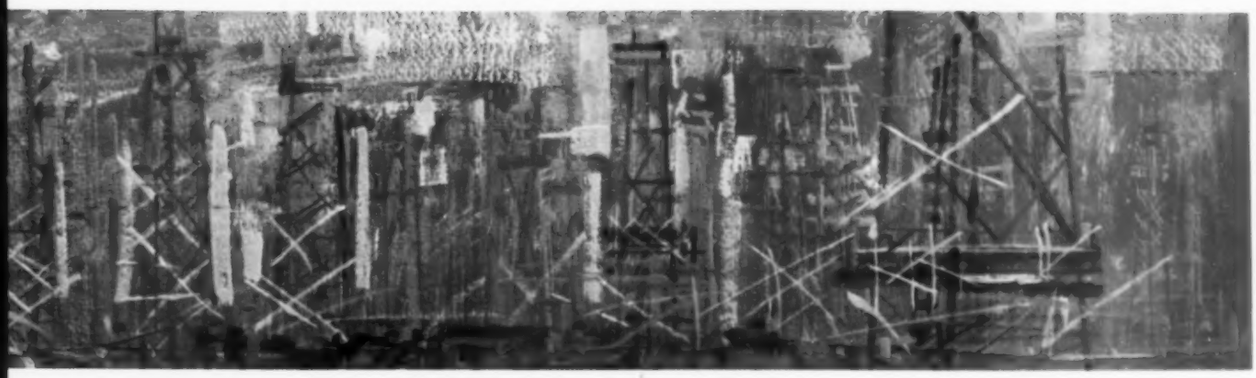
1930 ... The first bridge-type rock bit having replaceable watercourses to provide jet action on cutters and on bottom of hole

1929 ... The first rock bit with slush lubricated roller bearings

1928 ... The first bridge-type rock bit

1927 ... First field use of hard metal applied to cutter gage faces

1926 ... Reed introduced a rock bit with longer teeth and improved slush lubricated rolling cutters, greatly increasing footage per bit



industry on it's 100th anniversary

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For 42 years Reed has been a part of the petroleum industry and through continuing research and service has contributed to the growth of this industry by designing and selling tools that help to produce more oil, more economically. The items listed are representative of Reed's contributions through the last 42 years.

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REED'S ROLLIN'

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1925... The first rock bit with slush lubricated rolling cutters

1926... Reed pioneered the Full Hole tool joint which was to become API standard

the company added 5 ft to the rig's mast, installed a special wire-line winch, added new controls, revitalized the power train, installed lights for night work, and added new motors. A wire-line core barrel is used to obtain 1⅛-in. cores which are assayed on the site.

In addition to the drilling rig, the field equipment includes a water truck, pickup truck, laboratory trailer, and crew trailer. All motor vehicles are four-wheel-drive to assure mobility in the sandy, almost-roadless plateau.

The laboratory is equipped with a complete wet-chemical analysis setup which permits chemical determination of any mineral. A petrographic microscope, oil-immersion equipment, and Geiger counter (actually a scintillator) are included.

Electricity is provided by a portable 3,000-watt generator and an auxiliary generator used mainly for electric-logging equipment. Water is hauled in from nearby towns, and usually costs 50¢ for 500 gallons.

The well-organized crew can pack all gear, break camp, and move to a new site in two hours. Left behind is a small 4-in. by 5-in. wooden monument sunk in concrete, telling the core-hole number and exact location. The crew does all its own surveying, and makes its own roads.

Directing the field operation is R. G. Maynard, regional geologist for Sunray's Pacific Coast area. Dr. Maynard, former UCLA instructor of petrography and one-time infantry battalion commander in the South Pacific during World War II, headed the team which maneuvered in the desert on a militarylike basis. The crew worked four 10-hour days a week.

The two trailers were airconditioned to provide the crew an escape from the blistering heat which often soars to 125 F in midsummer. Two refrigerators assured the men fresh foods. A small shower was available, but the husky outdoorsmen found it handier to take a sponge bath out of a big wash basin than to squeeze into a trailer's shower nook.

Most of the crew chose to sleep in a sleeping bag on an army cot out in the open, but there were facilities for all to sleep inside the trailers in case of high winds, storm, or a heavy run of rattlesnakes or coyotes.

Breaking the monotony of each day's work were the ear-splitting sonic blasts which erupt when weird-shaped experimental jet planes from nearby Edwards Air Force base zoom overhead and crack the sound barrier. The crew learned to spot the experimental planes by special colors used on the aircraft. On a distant hill, rocket-testing bases could be sighted with their needle-noses pointed skyward.

Along the road, several miles from the drilling sites, are experimental laboratories used for testing new fuels. Sandbags around certain buildings mark especially dangerous operations.

The drilling site itself is bleak, inhospitable, and ovenlike; the Mojave stands today as the same region of desolation which has existed for centuries. The animal life consists of desert terrapins, kangaroo rats, rattlesnakes, coyotes, tarantulas, flying ants, and eerie-voiced owls.

The only plant life consists of cactus, sagebrush, and the forlorn Joshua trees, named by the Mormons in 1851 as they plodded from Salt Lake City en route to founding the city of San Bernardino. These pioneers likened the tree to the uplifted arms of Joshua who was finally exempted from the divine sentence that he should fall in the wilderness because of lack of faith. Some Joshua trees are 1,000 years old, descendants of the only surviving link to the days when the Mojave was another world.

In 1938, the skeleton of an Ice Age elephant was discovered in the Mojave near Saltdale. Other huge prehistoric animals once roamed the area—strange camels, saber-toothed tigers, and giant beasts which fed off tree tops. Tropical forests once covered the region; and rivers and lakes abounded. But that was millions of years ago. The last of the small lakes which once dotted the area probably dried up about the time Columbus planted foot in the New World.

Geologists say the 25,000-square-mile quadrangular region which is now Mojave was covered at least twice in ancient periods by an encroaching ocean. The region later raised itself to a precipitous land of sheer, needle-like volcanic crags and deep chasms. Volcanic ash, mud, lava, and effects of erosion at last filled the gorges; then great chains of warm lakes, linked by the now-dry Mojave River, supported tropical animal and vegetable life. Slowly, with the rising of encompassing mountain ranges, the Mojave became a cooped-in desert.

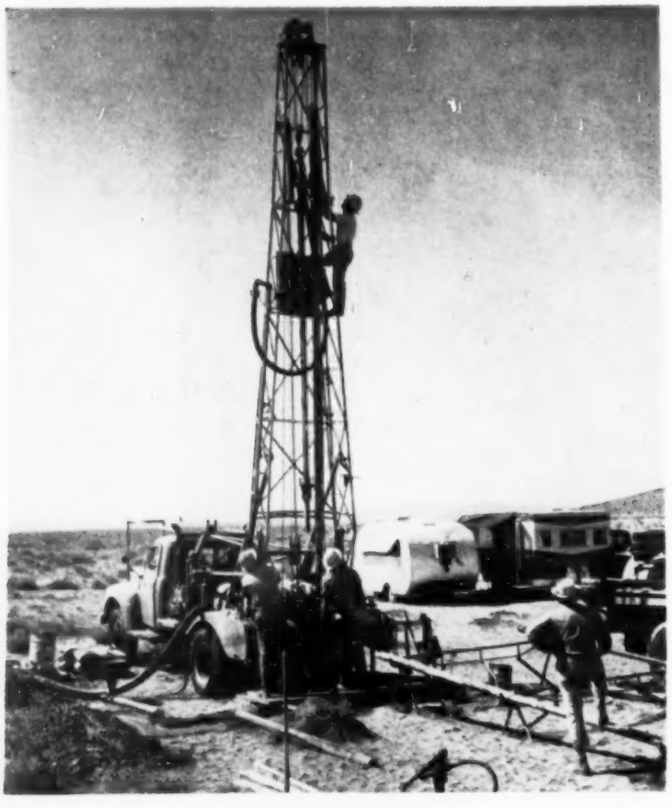
Today, all that remains are some 50 scorched valleys and scarred, worn-down mountain ranges. No lakes survive. Nor rivers. The one-time lakes are recognizable today as hard, table-flat expanses which can accommodate the biggest aircraft for landings. Some are used for that purpose. Called playas, these "lakes" hold intense interest for Sunray geologists who are coring into their depths to find strange earths which were washed into the basins thousands of years ago.

It was across this parched earth that the famed 20-mule teams once hauled their cargo form Death Valley and other borax pits to the little town of Mojave. And it was in this vast Mojave area that the discovery of the Yellow Aster gold mine in 1895 brought thousands of prospectors, miners, tenderfeet, merchants, a few good women, a lot of bad women and swindlers.

Simple and descriptive names of towns, dry lakes, and other landmarks tell the stark story of this bygone era—Dead Man Point, Blackwater Well, Skidoo, Surprise Spring, Alkali Flat, Siberia, Bitter Spring, Needles, Devil's Playground, Sidewinder, Mirage Lake and, most famous of all, Death Valley.

Despite its wild desolation, this country still holds a death-grip fascination for some men. Its emptiness, its closeness to ancient times, its crackling-dry air, its magnificent colors after an infrequent rain all tend to handcuff the hardier breed to its harsh charms. But all of its charm, all of its tragedy, and most all of its man-made history involves just that surface portion of the desert visible to the eye.

Few men have bothered to look closely beneath this harsh surface to see what minerals nature deposited there over the centuries. It is this mystery which has captured the imagination of mineral-minded Sunray explorers and inspired them to stake a new claim on this desolate wilderness. END



Sunray's desert exploratory crew prepares to take down shot-hole rig to move to new location.

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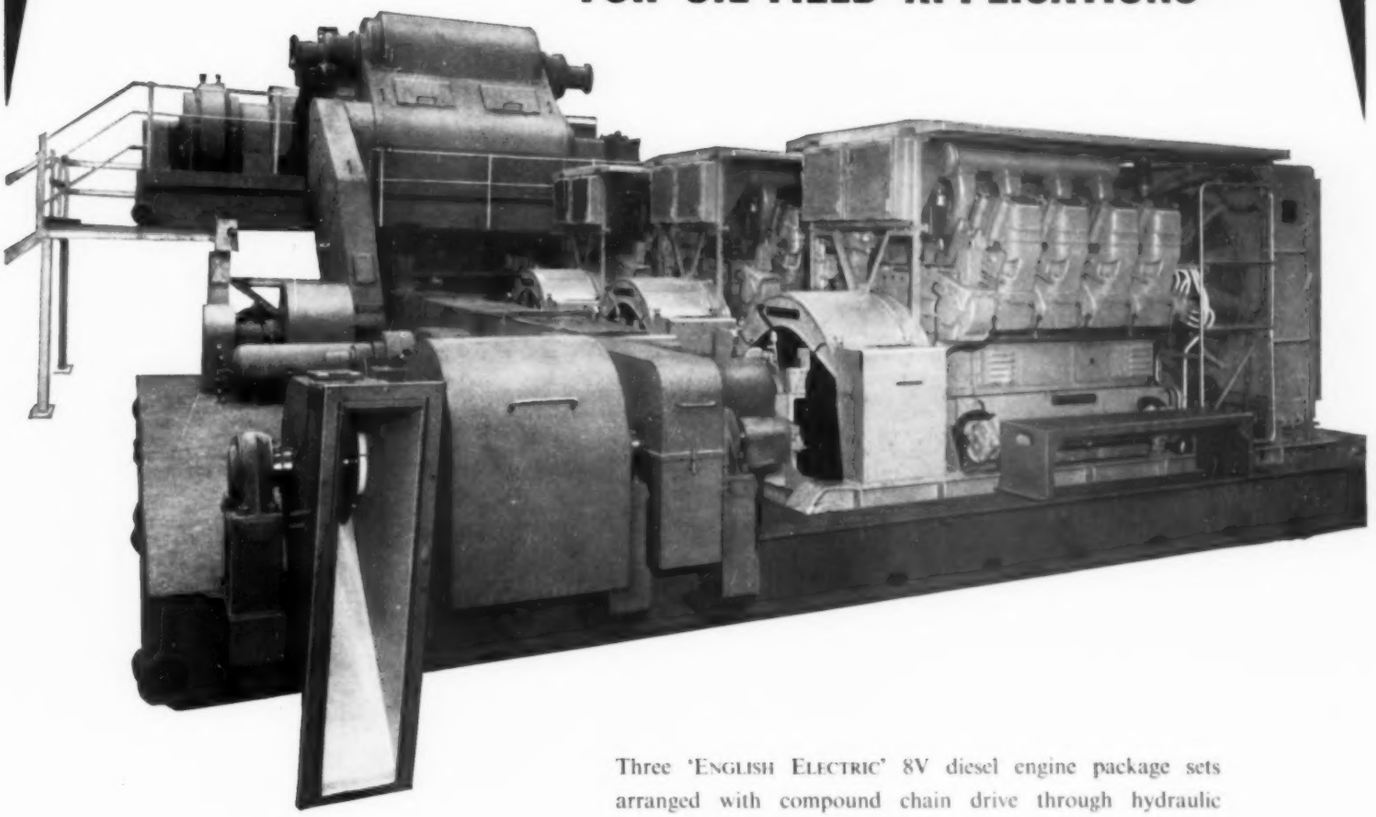

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OIL COMPANY STAFF CHANGES

R. W. Wales

J. S. Bell

ROBERT W. WALES has been appointed general counsel of Standard-Vacuum Oil Co.

D. B. FURLONG has been elected president and general manager of Producers Pipelines Ltd., Regina, Canada. He also has been elected vice president and general manager of Westspur Pipe Line Co., an affiliate.

R. G. B. DICKSON, has been elected to the board of Bailey Selburn Oil & Gas Ltd., Calgary. He is a director of the Imperial Bank of Canada, Federal Grain Ltd., Martin Paper Products Ltd., Trans-Prairie Pipe Ltd., and other Candian companies.

Dr. HUGO H. PETER has been appointed European technical representative for Standard Oil (Indiana) and its affiliate, Amoca Chemicals Corp. His headquarters are in Paris, France, in the office of Societe Civile Amoco (41 Avenue George V).

ALBERT F. LAGER, resident manager of the Oasis Oil Co. of Libya, has been appointed special representative for the parent Ohio Oil Co., effective June 1. He is succeeded by **R. E. McMILLEN**, who was to go to Libya April 1.

JOHN S. BELL, California area manager of Humble Oil & Refining Co., officially assumed office as 1959 president of the Socy. of Petroleum Engineers of AIME during the AIME annual meeting in San Francisco in February.

J. K. JAMIESON, a vice president of Imperial Oil Ltd., resigned to become president of International Petroleum Co. Ltd., at Coral Gables, Fla. International was formerly an Imperial subsidiary, and operates in Venezuela, Colombia, Ecuador, and Peru.

LEWIS G. WEEKS, consulting geologist, Westport, Conn., became the 43rd president of the American Assn. of Petroleum Geologists. Serving with Mr. Weeks on the 1959-60 Executive Committee of the world's largest geological organization will be **GEORGE S. BUCHANAN**, director, Husky Oil Co., Cody, Wyo. as past president; the present secretary-treasurer of the association, **HAROLD T. MORLEY**, chief geologist, Pan American Corp., Tulsa; and two other newly elected officers: vice president **ALFRED H. BELL**, head of the Oil & Gas Section, Illinois State Geological Survey, Urbana; and editor, **GROVER E. MURRAY**, Boyd professor of geology at Louisiana State University, Baton Rouge.

EDWARD LITTLEJOHN has been appointed assistant manager of the Public-Relations Department of Standard Oil Co. (N.J.) Since 1955, he has been director of public relations for Burroughs Corp. in Detroit. At the same time it was announced that Theodor (cq) Swanson, a member of the department since 1954 and head of the group which handles contacts with affiliated companies, also has been named an assistant manager. Other assistant managers of the department are W. P. Headden and James Crayhon.

B. L. Majewski

R. J. Waugh

BERNARD L. MAJEWSKI, president of Great American Oil Co., Chicago, has been elected to the board of Universal Oil Products Co., Des Plaines, Ill. Mr. Majewski fills the board vacancy resulting from the resignation of Fred C. Koch.

W. C. KERNAHAN has been appointed manager, direct advertising, in the Gulf Oil Corp.'s advertising and sales promotion department. He succeeds the late J. A. Burgess.

HAROLD S. BELL, consulting engineer, has moved his offces to 382 Springfield Ave., Summit, N. J. Offices formerly were in Newark.

HAROLD W. HAIGHT, chairman of Carter Oil Co., has been elected a director of Esso Research and Engineering Co. Both companies are affiliates of Standard Oil Co. (New Jersey). Mr. Haight was formerly with Creole Petroleum Corp Jersey Standard's Venezuelan affiliate. He was president and director of Creole when he resigned in February 1959 to become board chairman of Carter. Mr. Haight retains his post with Carter.

C. W. LUTZ, has been appointed director-planning and economics department, Gulf Oil Corp. He succeeds **P. H. BOHART**, vice president, who was recently designated administrative vice president and coordinator, crude-oil department.

JOHN BLAIR MOFFETT

John Blair Moffett, senior partner of the Philadelphia law firm of Moffett, Frye & Leopold, and for 37 years counsel for Sun Oil Co., died recently in Bryn Mawr Hospital. He was 73.

EUGENE A. DURDEN has been named resident auditor of Sun Oil Co.'s Latin American production division. He will be located in Maracaibo, Venezuela.

F. L. FOX, vice president and manager of the contracts and insurance division of The Ohio Oil Co., retired February 1, after completing more than 43 years of service. R. H. Brown, manager of the corporate records division, has been named manager of the newly consolidated corporate records and insurance divsiions.

J. LAWSON KENNEDY has been appointed manager of the White Oil Sales Division of L. Sonnebon Sons Inc., New York. He is responsible for domestic marketing of Sonneborn's products.

H. R. SHEPHERD, of Ponca City, Okla., has been named assistant manager of Cities Service Oil Co.'s industrial-relations division. He will supervise the labor-relations phase of the division's activities. Divisional activities having to do with employment, employee development, and safety will be supervised by W. L. Ambrose, another assistant manager.

GILBERT W. HUMPHREY, president and director of Hanna Mining Co., Cleveland; OGDEN PHIPPS, chairman of Bessemer Securities Corp., New York; and DWIGHT P. ROBINSON, Jr., chairman of Massachusetts Investors Trust, Boston, have been elected new directors of The Texas Co.

JACK W. STACKPOLE has been appointed to a newly created position of special representative to coordinate foreign and domestic crude-oil sales of the Lion Oil Division, Monsanto Chemical Co. His headquarters will be in Houston. Because of Monsanto's increased foreign production, principally in Venezuela, it became necessary to have full-time supervision of this activity.

CHARLES A. STOLLERY, of Calgary, and **GORDON B. GRANT**, of Regina, have been appointed to the board of directors of Royalite Oil Co.

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World's Largest Truck

For use in the Saharan desert oil search (although it appears to have many other applications as well) the Berliet Co. of Paris, France, has developed the world's largest truck. One is on its way to the Tulsa Petroleum Exposition at present, being driven from a Gulf port to Tulsa and choosing its route carefully to avoid traffic, since it is too large to pass on most roads. The giant heavy-duty truck is capable of carrying payloads of up to 100 tons over any surface. Approximately 13 ft high, 16 ft wide, and 41 ft long, its 6 wheels are driven by a 600-hp diesel engine and equipped with tires 8 ft in diameter. Yet, despite its size, it is driven with ease, having numerous power-assists, viz.: power steering, power gearshift, power brakes, etc.

The Berliet T-100 can, because of the low pressure of its tires, travel easily over long distances where there are no highways and over all kinds of terrain. Its ability to transport cumbersome and heavy equipment makes it a conveyor much more economical and practical than any other known type of carrier.

The cab, called "Cabine Relaze," has been designed to eliminate driver fatigue: a filtered air-conditioner keeps the driver's compartment at the right temperature at all times; comfortable seats, five abreast, have been installed in pleasant bright colors; the fully equipped instrument panel is easily readable day or night; and a two-way radio keeps the operator in constant touch with his base even as far as 200 miles away.

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Oil Law Reference Work

Canadian Oil and Gas, by Lewis and Thompson: A 3-volume work containing a statement of the law of oil and gas in Canada (Volume A); the case law (Volume B); and all the forms used in the industry (Volume C). A useful compilation not available elsewhere. It is a reference service, selling for $75 and kept up-to-date by loose-leaf insertions. Available through Butterworth & Co. (Canada) Ltd., 1367 Danforth Avenue, Toronto 6, Ontario, Canada.

40-Year Man

Eugene Holman (left) chairman and chief executive officer of Standard Oil Co. (New Jersey), is shown receiving an employee service pin as he completed 40 years with the Jersey Standard organization. In ceremonies at the Jersey company's headquarters in New York, M. J. Rathbone, president, presented a 40-year pin to Mr. Holman, who started his career in 1919 as a geologist.

Heads Pure International

The Pure Oil Co. has established a new foreign operations department as part of its exploration and production division, and appointed Glen R. Harsh to head it. The department will handle exploration and development activities for the company outside the continental United States. Mr. Harsh, who has had more than 25 years' experience in worldwide and domestic exploration and production, will have headquarters at Pure's general offices in Chicago. He was formerly with Cities Service. Foreign geological offices, under the direction of William L. Carr, will become part of the new department, but will remain in Forth Worth, Texas, for the present.

At its recently held 5th annual convention in Bermuda, the Pipe Line Contractors Assn. of Canada elected as president, D'Arcy J. Baldwin of Vancouver, president and general manager of Marine Pipeline and Dredging Ltd. Shown in the photo is the association's board of directors for the coming years (standing, left to right) E. A. Hooper, Toronto, second vice president; Robert B. Somerville, Sarnia, director; R. K. Banister, Edmonton, director; W. Douglas Porter, Toronto, director; A. O. Ackroyd, executive secretary of the association. Seated, left to right, are George Wilkinson, Vancouver, treasurer; D. J. Baldwin, Vancouver, newly elected president of the association; G. Walker, first vice president; and C. A. Callahan, Toronto, past president.

Interprovincial Rates Down

In view of competition from foreign crude, Interprovincial Pipe Line Co. has announced reductions in its rates to Sarnia and the Toronto area on March 23 and to delivery points in Michigan when necessary tariffs are filed with the Interstate Commerce Commission.

The rates from Edmonton and Cromer to Sarnia have been reduced by 8¢ and 5¢ per bbl, respectively; and the additional charge from Sarnia to Toronto is being reduced to 4¢ per bbl from 8¢.

In announcing the reductions, T. S. Johnston, Interprovincial president, stated that, in view of the opening of the St. Lawrence Seaway and the recent reductions in the price of foreign crudes—which make these crudes even more attractive to the Sarnia and Toronto refiners—the company has decided to assist in meeting the competition by a rate reduction of these points. He stated also that, during the first two months of 1959, deliveries to the Toronto area averaged better than 90,000 b/d, compared with 42,366 b/d in 1958.

Flexible Barge Used in UK

Several commercial deliveries of 40-ton loads of kerosene have recently been made by Dracone flexible barge towed from Esso Petroleum's Fawley refinery. The 100-ft long by 5-ft-diameter envelope of strong woven nylon cloth coated with synthetic rubbers was towed by a 45-hp launch on which a pumping unit had been mounted. This consisted of a Petter PC 2 diesel driving a Goodyear size 12 pump, and the Dracone was emptied in 65 min. The intention for ordinary commercial use is to wind the vessel onto a reel and stow, and to tow it after discharge of the cargo, and a special towable reel is now being developed. After emptying, the Dracone was allowed to flatten and sink onto the muddy harbor bottom, and was then inflated with carbon dioxide for the return journey.

Prototype Dracones have received very rough treatment. One was caught and partly submerged beneath a rusty and barnacle-covered steel lighter; but, although the Dracone and the lighter had to be separated by two small tugs, the Dracone showed no sign of damage even though the steel barge had many of its barnacles scraped off. In fact, it is felt that steel barges are far more vulnerable to submerged sharp rocks than are Dracones.

New Pipeline in Israel

Agreement has been reached concerning a new 16-in. crude pipeline from Eilat on the Red Sea to Beersheba, to replace existing 8-in. line. It will have a capacity of about 100,000 b/d. A French group headed by Baron Rothschild will finance this project.

Cuban Oil Mineral Laws

A two-volume compilation of Cuban oil and mineral laws, the only work of its kind, has been published in Havana. In English and Spanish, *Legislation de Minerales Combustibles de Cuba* was prepared by Dr. Miguel R. Gomez Bustillo of the law firm Gomez Bustillo y Abadin, a specialist in Cuban oil and mining legislation and secretary, director and/or legal representative for numerous Cuban and foreign companies, who is well qualified to prepare this exhaustive compilation and interpretation of Cuban mineral fuel law.

Cuban Legislation on Mineral Fuels consists of two volumes containing more than 2,400 pages. It is in Spanish, with extensive English translations. An essential reference book for everyone concerned with Cuban oil legislation and the management of oil companies in Cuba, it is available for immediate delivery from Cuba Petroleum News Digest, Edificio Habana 804, Habana 258, Havana, Cuba. Price is $30 the set.

Continental Buys San Jacinto

An agreement now has been reached by Continental Oil Co. and San Jacinto Petroleum Corp. for the acquisition by Continental of a two-thirds interest in San Jacinto. Under the proposed plan, San Jacinto will authorize and issue to Continental twice the number of shares of common stock which San Jacinto has outstanding or reserved for stock options and conversion of its convertible debentures. In return, Continental will deliver to San Jacinto 824,000 shares of Continental capital stock of which 739,788 shares will be distributed as a dividend by San Jacinto to its present stockholders, at a rate of 0.344 share of Continental stock for each share of San Jacinto stock now held, and the balance will be reserved for the exercise of San Jacinto's outstanding stock options and for conversion rights under its outstanding convertible debentures. The Continental stock will be a return of capital to the San Jacinto stockholders, and will not be taxable as ordinary income.

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Top-Level Socony Changes

Effective, March 1, several basic changes in the organization of Socony Mobil Oil Co. were made, according to Albert L. Nickerson, president and chief executive officer. Changes include creation of two new operating divisions and a reassignment of responsibilities in the company's corporate management.

Mobil Oil Co. is the newly formed operating division for the USA and Canada. Herbert Willetts, a member of Socony Mobil's board, becomes president of the division. Mobil International Oil Co. is the new operating division for the other countries of the Free World where Socony Mobil operates. Herman J. Schmidt, who is also a director of Socony Mobil, is president of this division. Both Mr. Willetts and Mr. Schmidt become executive vice presidents of Socony Mobil.

Socony Mobil's corporate organization, which will be primarily concerned with policy making, planning, and worldwide coordination, will be divided into five groups. One group will be headed by Fred W. Bartlett, chairman. The other groups will be headed by four directors, each of whom has been designated a senior vice president of the company. They are Paul V. Keyser, Jr., Clark S. Teitsworth, Fred W. Wilcox, and Arthur V. Danner, who was elected to the Socony Mobil board, effective February 15. Except for the election of Mr. Danner, there are no changes in the membership of the board.

Mobil Oil Co. and Mobil International Oil Co. will handle all operations of Socony Mobil, with the exception of the marine transportation department which will continue to be administered on a corporate level. The two new operating divisions will coordinate with all affiliated Mobil companies in the USA and abroad. The five groups within Socony Mobil's corporate organization will be: (1) administrative, under Mr. Bartlett; (2) research and engineering, under Mr. Danner; (3) planning, under Mr. Keyser; (4) exploration and producing, under Mr. Wilcox; and (5) supply and distribution, and marine transportation, under Mr. Teitsworth.

Herman J. Schmidt, first president of the new Mobil International Oil Co., has announced three additional executives appointed to important positions in the new organization, as follows:

Victor H. King has been appointed exploration manager, reporting to vice president H. R. Moorman of Mobil International Oil Co. Recently Mr. King had been elected a director of General Petroleum Corp. in charge of exploration, and has resigned this position with Socony Mobil's West Coast affiliate.

Geoffrey R. Lucie-Smith becomes producing manager of the new company, reporting to vice president Moorman. Prior to the new appointment, Mr. Lucie-Smith had been assistant general manager of the Libyan operations of Mobil Oil Co. of Canada Ltd.

William E. Lindenmuth has been appointed a regional executive for the Middle East, reporting to vice president Rawleigh Warner, Jr., of the new international Socony Mobil affiliate. Mr. Lindenmuth has been an attorney in the Socony Mobil office of general counsel since 1955.

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RAP Discovery in France

Regie Autonome des Pétroles, which has been drilling in three locations in the Paris basin, has encountered oil in commercial quantities in Brie 101, ten kilometers southeast of Melun, near the village of Chartrette, in the Dogger limestones, between 1,630 meters and 1,643.6 meters. This is the same producing series as in *Chailly-en-Bière*, producing oil field of Compagnie d'Exploration Pétrolière, which is only about 20 kilometers distant. Brie 101 is the fourth find in the Paris basin in a year's time.

Two productive horizons were defined, both limestones of the Dogger, separated by marls and chalky limestones. Separate tests were encouraging. A test from both horizons gave a flow of 3.5 cubic meters per hour at surface level. Further tests are being conducted, while production is easily maintained at 75 cubic meters per day (472 b/d) for three weeks. The company hopes to maintain a regular flow of over 300 b/d. The oil is light, of excellent quality; API gravity 35; and sweet, totally devoid of sulfur.

Heads Sinclair-BP Co.

Sinclair Oil Corp. and The British Petroleum Co. Ltd. have announced organization of a jointly owned company to engage in crude-oil exploration and production ventures, primarily in Latin America. The new company, incorporated as Sinclair and BP Explorations, Inc., is one of two companies formed pursuant to the program announced in October 1958 by Sinclair and British Petroleum. It is headed by WILLIAM O. CLIFT, president and chief executive officer, and A. F. MacLEOD MATTHEWS, senior vice president. As general manager since 1957, Mr. Clift was head of the Sinclair Somal Corp. exploratory program in Somalia.

Other executives who have joined the new company are H. R. WARMAN from British Petroleum, who is a vice president and chief geologist; F. C. R. MARTIN, a geologist also from British Petroleum, who is to establish an office in South America; and RAYMOND HALSEY, formerly a geophysicist with Sinclair Oil & Gas Co., who will be chief geophysicist. Offices are in the Sinclair Oil Building, 600 Fifth Avenue, New York.

New SO Ind. Alkylate Plant

A new high-octane gasoline plant has been put into operation at the Standard Oil Co. (Indiana) refinery at Mandan, N.D. The new unit has capacity of 1,630 b/d of alkylate. The alkylation unit is the second major addition to Mandan's gasoline-making facilities since the refinery was completed in 1954. Foster Wheeler Corp. was contractor.

THE ARABIAN PENINSULA, by Jean-Jacques Berreby: A detailed review of political and economic problems of the Arab states. The author was born in Algeria, and has been associated with the Institute for Advanced Moslem Studies in France. Written in French (complete French title is *La Peninsule Arabique*). Available from Editions Payot, 106, Boulevard Saint-Germain, Paris, France. Price is 1,200 francs (US $2.86).

"Alton Jones" Launched

The S.S. "W. Alton Jones," giant new supertanker built for Cities Service, is shown being christened with traditional ceremony, on March 7, at the Uddevalla shipyard, Uddevalla, Sweden. The sponsor, Mrs. W. Alton Jones, christens the huge tanker. With an overall length of 824 ft, 8 in., the 70,000-ton vessel is the biggest tanker ever built in Europe. It is the first of three such tankers which will be built at the Swedish shipyard for Ships Inc., a subsidiary of Cities Service.

Plastics Welding Book

A comprehensive review of the welding of plastics is contained in *Welding of Plastics*, by J. A. Neumann and F. J. Bockhoff. The treatment ranges from initial design procedures to final detailed fabrication methods. Various physical and chemical properties of individual plastics presently used for welded construction are covered with regard to their use in chemical and allied processing. Presently known techniques of welding are covered in detail, and many step-by-step producers with photographs are included.

The Texas Co.

The board of The Texas Co. has voted to change the name of the company to Texaco Inc., Augustus C. Long, chairman, has stated. "The wide distribution and sale of its products bearing the trademark 'Texaco' in all 49 states and in many foreign countries have resulted in the company being generally known and referred to as 'Texaco' by its stockholders, customers, employees, and the general public," Mr. Long said. "The change in name has been the subject of intensive study for several years, and the names of many subsidiaries have already been changed to include the name 'Texaco'."

Mr. Long pointed out that changing the name of the company to Texaco Inc. would be beneficial in its marketing and advertising programs and in its relations with the public at large.

McCollum Honored by SEG

A man whose accomplishments in the field of geophysics date back more than 40 years, Burton McCollum, received the highest honor, October 13, which can be bestowed by the Society of Exploration Geophysicists, a lifetime membership. The presentation was made in San Antonio by Dr. Sigmund Hammer, of the Gulf Research and Development Co.

The distinguished scientist holds many patents, 13 of which pertain to geophysical exploration; six of these on reflection methods, two covering deep profiling on salt domes—with the others being on refraction fan method, gas gun, integrating recorder, weight dropping, and geograph techniques. In addition to the field of seismograph, he holds numerous patents covering a-c electric motors.

Boron Gas "Down Under"

Boron gasoline has gone on sale at the retail outlets of Ampol Petroleum Ltd., throughout all of Australia. The Standard Oil Co. (Ohio) has licensed Ampol to use boron.

Fenske Cited

Dr. Merrell R. Fenske, director of the petroleum refining laboratory of The Pennsylvania State University, was presented with a Certificate of Appreciation on the 30th anniversary of his research relationship with the Pennsylvania Grade Crude Oil Assn. Dr. Fenske started the work of the laboratory at Penn State 30 years ago.

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Murphree On Research

Only real offset against inflation-swollen costs in oil and chemical refining operations lies in new design features and more efficient processes, according to Eger V. Murphree, president of Esso Research and Engineering Co. Mr. Murphree said a detailed study made by his company showed that better design and improved processes had cut new refinery equipment costs by about 5% a year. "This has more than taken care of the forces of inflation so that over the years, on an actual dollar basis, the cost of new equipment to do a given job has decreased."

Mr. Murphree also reported now techniques may make it possible to double the nation's petroleum reserves, present and potential. These same methods may be useful, he added, when it becomes economical to develop oil shale and tar-sands deposits. The Esso Research president said the water-flooding method of oil recovery, now commonly practiced, produces an average of 50% more oil than can be obtained with primary methods. The injection of rich gas into reservoirs—another method—can give "very high recoveries" in certain cases and, according to laboratory data, is capable of 100% recovery.

Mr. Murphree also estimated that American petroleum research now amounts to some $300 million a year, and has been expanding at the average rate of around 12% annually. Investment in American petroleum industry is estimated at about $47.4 billion. Consumption of oil products in the USA is at the rate of some 8,900,000 b/d, and represents about 56% of world total. Drilling expenditures in 1957 in the USA were around $4.4 billion.

To Spend $1 Billion In 1959

Eugene Holman, Jersey Standard board chairman, has stated "The prospect of an increase in US demand for petroleum, together with a rising demand in other free world areas, makes the near future outlook for demand more optimistic than at this time last year.

"We expect that a continued rise in general business activity will result in a new high for petroleum demand in the United States, possibly amounting to about 5% over 1958. In the rest of the free world, too, the industry growth rate should accelerate, and we are looking there for about an 8% increase in 1959.

"We believe our product sales volume will rise again in the coming year, as it did in 1958, by reason of the vigorous marketing programs now being carried on by the companies affiliated with Jersey," he said, "but profit margins have been squeezed."

The confidence of Jersey Standard and its affiliates on the long-term growth prospects for petroleum energy is best expressed, Mr. Holman pointed out, by the company's program in 1959 which calls for spending about $1 billion for capital expenditures for producing, refining, marketing, tankers and pipelines, and for other expenditures in the search for oil and gas. This is about the same amount as spent in the current year for these purposes.

About 42% of the consolidated companies' 1959 capital expenditures program will be in the United States; 32% in Canada, Latin America, and other parts of the Western Hemisphere; and 26% in free areas of Europe and other parts of the Eastern Hemisphere.

Indications are that worldwide demand for Jersey Standard's major petroleum products will show an increase in 1958 of about 4% over 1957, Mr. Holman said, "and we look forward to increasing sales volume in 1959 if current economic trends continue."

German Oil Data

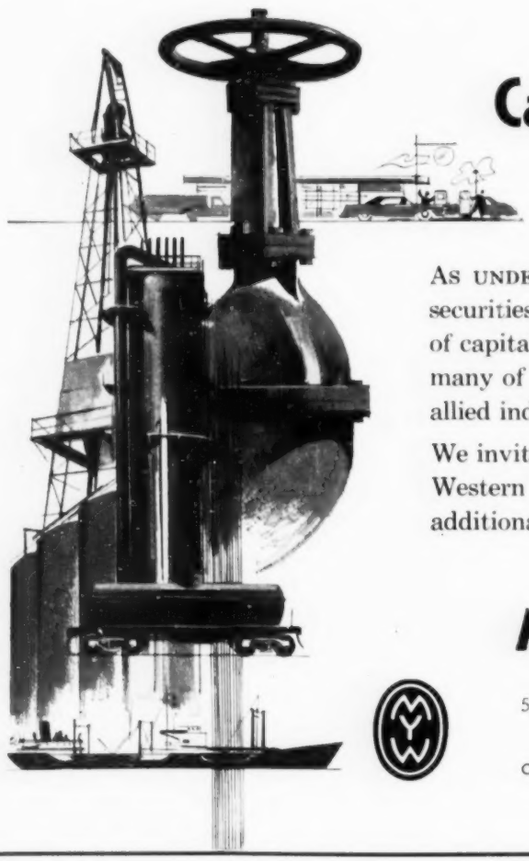
Coal, Mineral Oil, and Natural Gas (In German): A compilation of statistical, technical, and economic data, well organized and critically reviewed. In the discussion of coal (120 pp.), oil (70 pp.), natural gas (9 pp.), and oil shales (5 pp.)—emphasis is on the current situation in Eastern Europe. Title is "Kohle, Erdoel Erdgas." Authors are Professor Helmut Haertig and Rudolph Schmidt, petroleum engineer. (Publisher: Wilhelm Knapp, Muehlweg 19,

Members of International Petroleum Exposition NOMAD committee make plans for their traditional international party which will be held during the May 14-23, 1959, oil show. Don Collins, Republic Supply Co., IPE NOMAD chairman says 4,000 persons are expected to attend.

Standing (left to right) are R. C. Glover, Baker Oil Tools Inc.; Gilbert Swift, Well Surveys Inc.; and S. J. Raphel, IPE housing manager. Seated: Kenneth O. Hoevel, National Supply Co.; George W. Davidson, Jr.; W. C. Norris, Division of Dover Corp.; John Pearce, Superior Iron Works & Supply Co. Inc.; E. L. Thomas, executive secretary, Tulsa NOMADS; and Mr. Collins.

Ethyl-Fluid Delivery

A new method of shipping "Ethyl" antiknock compound overseas recently was inaugurated with the use of specially designed Sea-Land tanks. The tanks, designed by Ethyl Corp. engineers and built by the American Car and Foundry Division of ACF Industries Inc., are filled and transported by truck-trailer to dockside, where they are loaded into the ship's hold. At the port of destination, the tanks are lifted out of the ship's hold, and placed on another truck-trailer, for highway delivery to the refinery. Each tank holds the equivalent of approximately 40 drums of compound. Unloading time is reduced 75%.



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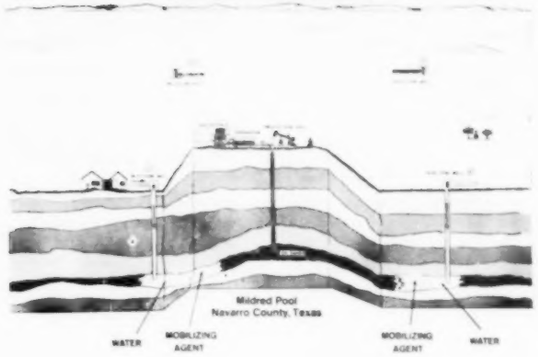


Secondary-Recovery Process

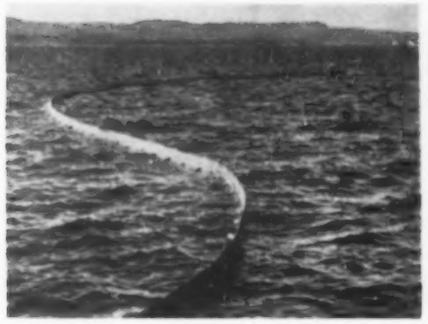
Hydrocarbon Chemicals Inc. has announced a new method of secondary recovery. Paul N. Belmont, president of Hydrocarbon, said "The new method, called VAMP (Variable Action Mobility Process), gives every indication of adding substantially to the nation's proved reserves by making possible the production of a portion of the unrecoverable crude in place."

Mr. Belmont revealed that the new VAMP method has proved much more effective and efficient than conventional water flooding. He said production from the pilot well, completed in July 1958, increased from 35 bbl per month in July to 703 bbl by October and 825 bbl by December, "a far greater increase than we have been able to achieve with conventional water flooding."

He pointed out an important advantage in the new process is that it results in increased production almost immediately. With normal water-flooding techniques, recovery does not take place for as much as 18 months when sufficient pressure has been built up to start noticeable reaction. The VAMP secondary-recovery method involves the use of a mobilizing agent as an advance treatment in the flooding. Exact composition of this agent was not revealed. This is then followed by water under heavy pressure.

Moves To Los Angeles

Tidewater Oil Co. has moved its world headquarters into a new $10 million building on Los Angeles' Wilshire Boulevard. The move coincides with the company's 80th anniversary celebration. Some 400 employees, headed by President George F. Getty II, made the move to Los Angeles from San Francisco. The new Tidewater building thus becomes the control center for petroleum producing, transporting, manufacturing, and marketing activities extending around the globe.

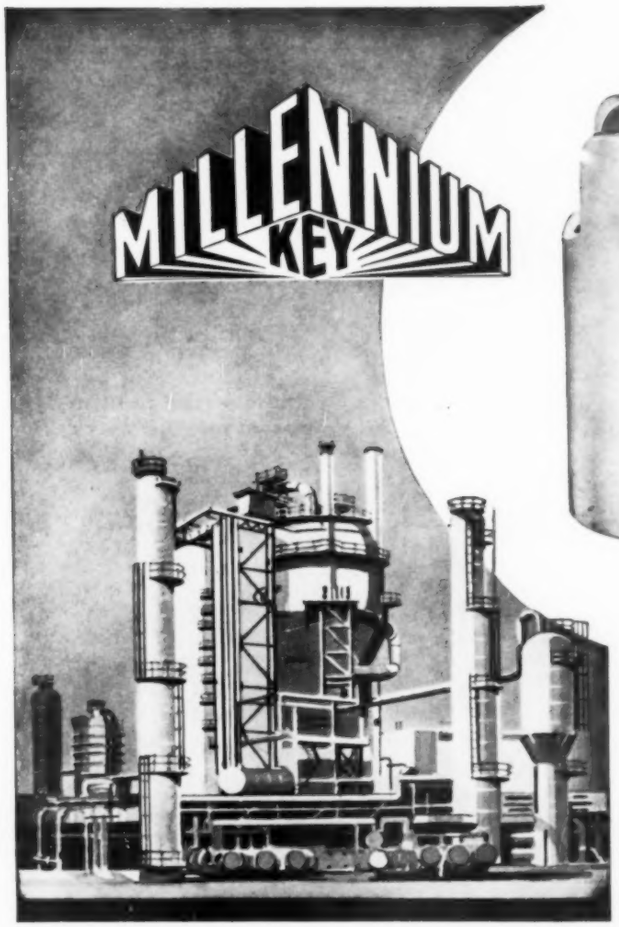


A device for containing oil after accidental pollution of the sea or of river waters by oil from cargo ships or tankers consists of a flexible boom which can be drawn round the patch of floating oil and so prevent it from spreading. The oil can then be concentratd and disposed of through suction ppies (Shell photo).

New Type Of Oil Boom

A Norwegian invention sponsored by Shell for containing oil accidently spilt in harbors or inland waters proved its value recently when fuel oil ran into Oslo Fiord. Five hundred yards of the new oil boom at Thune were run around the escaped oil, which was recovered without damage to hundreds of sailing boats competing in a regatta in the area.

The device, towable by rowing boat or motor launch, consists of plastic strips 50 yards long and 3 ft wide stiffened with aluminum rods and stabilized with weights every yard. It has compact plastic cork floats and rides vertically on the water, 2 ft below and 1 ft above the surface. Terylene strings connecting the strips enable the boom to be drawn in and the oil to be concentrated for removal by pump, and even in a swell or choppy water the lower edge will be deep enough to contain the escaped oil.



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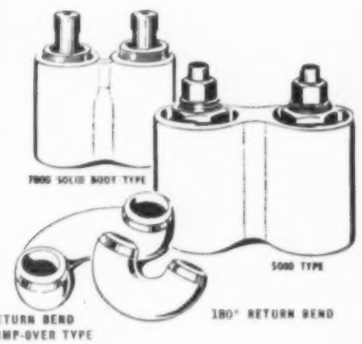

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Struth With API

Henry J. Struth, well-known petroleum consultant of Dallas, Texas, has been retained by the American Petroleum Institute to undertake a special investigation of the entire field of statistical information now available to and on the operations of the production branch of the industry, according to announcement of API President Frank M. Porter.

Venezuelan Dallas Consulate

Venezuela has a consulate in Dallas, Texas, and has asked that it be brought to the attention of our readers, since many persons are not aware of its existence. Located at 1309 Main St., it is open from 10 a.m. to 3 p.m.; closed on Saturdays and holidays. The consulate welcomes inquiries, and is happy to be of service to anyone interested in Venezuelan affairs.

Decker Honorary Nomad

The National Oilfield Manufacturers and Delegates Socy., better known to oilmen worldwide as the NOMADS, has announced election of Nomad founder E. L. Decker as honorary regent to act as consultant and advisor to the National Board of Regents, Nomads.

Mr. Decker, president of the Martin-Decker Corp., Long Beach, Calif., was instrumental in founding the Nomad organization in 1938.

Oil Must Adapt in Far East

USA manufacturers selling in Far East nations should establish long-term capital investments there, adapt to local ways and traditions, and stay out of politics, H. B. Nichols, senior vice president, California Texas Oil Corp., told the 42nd Annual Convention of the Export Managers Club of New York recently. "Capital investment," he pointed out, "builds up local production, utilizes local labor and is, for these reasons, generally more successful in its direct dealing with national sentiment. "We waste too much time complaining about the drawbacks of doing business in the Far East," Mr. Nichols continued. "The uncertain political conditions, the shifting social values, the unsettled economic climate with its apparently unpredictable trade and currency restrictions—these things aren't wholly negative, nor are they arbitrarily imposed by capricious governments."

Hyde Promoted At Magcobar

R. B. (Buddy) Hyde, Jr., has been promoted to export sales manager of the foreign operations department of Magnet Cove Barium Corp. In his new position, he is responsible for coordinating and supervising the sales and service activities of the company's worldwide drilling and marketing, which includes Europe, the Middle East, and South America. He will continue to be located at Magcobar's Houston office and laboratory building, 3133 Buffalo Speedway.

Oil Base In Latin America

George Miller and Jack Long, president and vice president, respectively, of Oil Base Inc., have left Compton, Calif., for an extended business trip to Venezuela. They will confer in Anaco with R. R. White, head of the newly formed Oil Base de Venezuela CA, wholly owned subsidiary which represents Black Magic and other drilling-fluid products manufactured by Oil Base Inc. in all areas of the world outside the USA and Canada.

Messrs. Miller and Long also will visit Mexico City, Caracas, Maracaibo, and Trinidad en route, and will spend time in Colombia with the Oil Base distributor (Volco Inc.) in Bogota.

New Web Wilson Elevators

Web Wilson has produced a new line of center-latch elevators which are reportedly superior in handling and safety characteristics while strikingly handsome in appearance. Known as "CHAMPION," the design permits a greater compactness than was formerly possible, yet allows more clearance for the installing of links. The swept-forward arms also account for the ease in which "CHAMPION" rolls and turns in the links, even for picking up single joints in the rig door. A slanted hinge pin provides the new Wilson elevator with a natural tendency to close when under load.

Komes Bechtel VP

Jerome W. Komes has been elected senior vice president of Bechtel Corp. and to the executive vice presidency and positions in the company's international subsidiaries and affiliates. He has been directing international operations, and now adds many of the duties formerly performed by the late George S. Colley, Jr., with whom he was associated.

New Graver Dialysis System

Development of dialysis equipment for the separation of acids and other chemicals from solution has been announced by Graver Water Conditioning Co. The new dialysis system is known as the Hi-Sep Dialyzer (for high-rate separation) and contains the first acid-resistant membranes. The Graver membrane is made of a new type of synthetic resin which is so tough that it will operate for a very long time without requiring replacement, repair, or cleaning. Thus, instead of requiring neutralizing equipment and chemicals for the discharge of acids to waste, these industries can now purchase equipment for recovery of acids which can be re-used in processing.

To Drill In Sardinia

Recent geological survey is expected to lead to early drilling program in coastal strip from Quartu S. Elena to Oristana in Cixerri valley in Sardina. The island is an Italian province with autonomous status and oil law similar to Sicily's. Present prospecting is carried out by regional government and West German firm of Wintershall AG.

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M. B. Roach

Dick M. Koons

Roach & Koons At Otis

Otis Engineering Corp. has announced the appointment of Dick M. Koons and Malcolm B. Roach as vice presidents of the corporation. Mr. Koons, director of the research and development department, joined Otis a year ago. He formerly was senior production engineer with Cia Shell de Venezuela, in Maracaibo. Mr. Roach also joined the company about a year ago, as general sales manager. A graduate of Princeton University, he was formerly president of the Dewey Supply Co., in Tulsa, and prior to that was a regional sales manager for the Dayton Rubber Co., in Dallas.

60-Ft Statue For Tulsa Show

A 60-ft Golden Derrickman will survey the exposition grounds from the mast of an operating rig, and guide visitors to Mid-Continent's machinery exhibit at The International Petroleum Exposition's Blocks 12 and 14. The operating drilling rig, complete with mast, engines, pumps, and other equipment, will be manned by special personnel. A covered platform will provide visitors an advantageous view of the drilling rig while closed-circuit television cameras transmit the activity to viewers in the Mid-Continent Building. Adjacent to the operating power rig will be exhibited other drawworks, engines, generators, rig drives, blocks, rotary tables, and various oil-field equipment.

Mid-Continent Supply and asssociated companies will occupy Blocks 3, 12, 13, and 14 in the Exposition at Tulsa. They will display a complete line of oil-field products and machinery.

Texas Instruments' Success

In all respects, 1958 was the most successful year in the history of Texas Instruments Inc., with sales 37% higher and earnings after taxes 60% greater than in 1957, the best previous year. 1958 sales were $91,953,845 and earnings were $6,000,928, of $1.84 per share of common stock, compared with 1957 sales of $67,338,574 and earnings of $3,765,362 or $1.11 per share of common stock. Texas Instruments has 3,256,988 shares of common stock outstanding.

Blaw-Knox Earnings

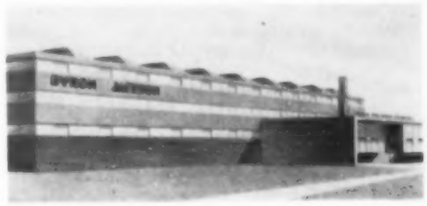
Blaw-Knox Co.'s 1958 annual report to stockholders showed sales and earnings slightly below the company's record 1957 performance. Sales were $167,709,000, about 8% below 1957, and net earnings were $6,932,000, or $75,000 under the record 1957 net. 1958 net was equal to $3.84 per share. A major influence on the company's outlook for 1959 is the improving rate of output in the steel industry, an important company market.

New SIE Electronic Center

Southwestern Electronics (SIE) has opened a new research, development, and manufacturing facility in Houston. One of the world's leading suppliers of quality geophysical instrumentation, SIE also produces electronic test instruments for industrial applications, control systems, and is subcontractor for military electronics and ground support equipment.

Hilliard At Web Wilson

Ben Hilliard is the new division sales manager for the Gulf Coast and export sales of Web Wilson Oil Tools Inc. He will operate from headquarters in Houston. Ray Gorman, division sales manager for the Mid-Continent, will assume the added responsibility for the Rocky Mountain and Canadian territories. Merrick Phelps continues as the Web Wilson sales representative for East Texas, Houston, and the Texas Gulf Coast. Mr. Hilliard's office address is 5805 Harvey Wilson Drive, Houston 20, Texas.



BJ Builds Holland Plant

Byron Jackson Tools Inc. has completed arrangements to establish a manufacturing plant for BJ Oil Tools in the Netherlands. Known as Byron Jackson NV., the company will construct a modern manufacturing plant at Etten en Leur, North Brabant Province in south Holland.

Earl M. Rees, formerly export sales manager, has been named managing director of the new company, and will also serve as European sales manager for Byron Jackson Tools Inc. Mr. Rees is now at Etten en Leur to supervise arrangements and construction. G. E. Mullinix will head engineering operations for this new overseas facility.

New Security Appointment

The appointment of Ralph Hughes as manager of manufacturing for the Dallas and Whittier operations of Security Engineering Division, one of the Dresser Industries, has been announced. Previously Mr. Hughes was operations manager of Security's Whittier plant where, for the past 13 years, he had occasion to handle many phases of oil-tool manufacturing.

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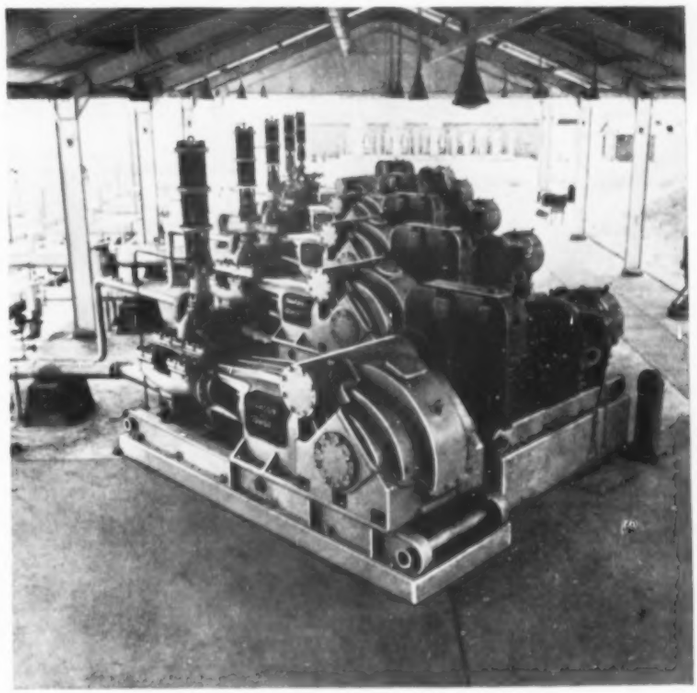
Illustrated is a series of pumps supplied to the British Petroleum Company's Oil Refinery at Aden for pumping diesel and fuel oils from the refinery to the B. P. International Oil Bunkering installation.



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Refinery Gas-Turbine Drives

Released by Clark Bros. Division of Dresser Industries Inc. at Olean, N.Y., is illustrated *Bulletin 166* presenting an analysis of the economic aspects of combustion gas-turbine application in the refining industry. Applications involving pump and compressor drives, power generation, and emergency use are discussed in detail. Illustrated with performance charts on fuel consumption, exhaust gas flow, and heat recovery, copies may be obtained by writing to Clark Bros Co., Olean, N. Y.

Hargrove Joins Bechtel

R. Clyde Hargrove has become associated with the pipeline division, Bechtel Corp. He will assist vice president Mahoney in pipe-line-project and business development. He has been elected to a vice presidency in Bechtel International Corp.

Ideco Reassignments

Berwin L. Price and Charles E. Wright, Ideco (one of the Dresser affiliates) technical service representatives, have been assigned to new territories. Mr. Price has been transferred to Tulsa, for Oklahoma, Kansas, and neighboring states. Mr. Wright will cover southeastern Texas, Louisiana, and Mississippi.

Wotkyns Joins American Iron

Haskell Wotkyns has been appointed special representative for the American Iron & Machine Works Co. Inc., Oklahoma City, W. R. "Bert" Wheeler, vice president of the oil-field equipment manufacturing company, has announced. Mr. Wotkyns previously was executive vice president of Maloney-Crawford Tank and Manufacturing Co., Tulsa.

Southwest Industries Expands

The five-year-old Southwest Industries Inc., of Houston, Texas, has added to its specialized services the design and construction of packaged plants to produce and purify inert gases. The expansion program includes appointment of additional personnel and opening an office in Calgary, Canada.

UOP Wieditz Promoted

Henry E. Wieditz has been appointed sales representative for anti-ozonant products of Universal Oil Products Co., Des Plaines, Ill. Prior to this appointment, Mr. Wieditz did research on anti-ozonant applications. Before joining Universal, Mr. Wieditz worked in production compounding and tire development at B. F. Goodrich Tire Co. He is a graduate of Iowa State College and a member of the Am. Chemical Socy.

Welex Promotions

New district manager for Welex Inc. at Winfield, Kans., is John Doyle, former field engineer there. Bill M. Scales, formerly division sales engineer, has been promoted to division credit manager of Welex at Midland, Texas.

New Milwhite Zones

Milwhite Mud Sales Co. has formed two new sales and service zones. The Mid Continent zone which includes Kansas, Oklahoma, North Texas, West Texas, and New Mexico, is under the supervision of Richard Ladd, Tulsa. The Rocky Mountain zone will service the Four Corners area up to the Canadian Rockies. R. J. Adamson will supervise operations from Denver, Colo., offices.

Re-Acquires Republic Supply

Negotiations have been completed by Republic Steel Corp. for re-acquisition of Republic Supply Co. which operates oil-country supply stores and pipe yards throughout the Mid Continent area. Republic Steel in 1948 sold Republic Supply to a group headed by Kerr-McGee.

In announcing re-acquisition, T. F. Patton, Republic Steel president, said W. J. McWilliams, president of Republic Supply, and all other officers will continue in their present capacities.

Netherlands Badger

Badger Manufacturing Co. announced it has become sole owner of Badger-Comprimo NV by acquiring the 50% interest in the firm held by Comprimo NV, Amsterdam. Effective with the sale, the subsidiary's name has been changed to Badger NV.

Badger-Comprimo NV originally was established in The Hague in 1956 to provide engineering, procurement, and construction services to the petroleum, chemical, pharmaceutical, and nuclear power industries desiring to use European equipment and currencies.

New Large-Diameter Plastic Pipe

A new development by Allied Chemical will make possible for the first time manufacture of polyethylene pipe in large-diameter sizes from A-C polyethylene pipe compound. Because of its unusually high-melt viscosity, this pipe compound cannot be extruded by ordinary methods. A successful extrusion technique utilizing standard extrusion machinery has been developed by Allied to take full advantage of the excellent physical properties of the compound.

Wishart For Stone & Webster

Donald F. Wishart, who has been chief project engineer of the chemical division of Stone & Webster Engineering Corp. in Boston, has been named engineering manager of Stone & Webster Engineering NV, recently formed subsidiary in The Netherlands. From 1948 until his new assignment, Mr. Wishart supervised various major projects, many of which involved work on foreign assignments. At one time he was acting managing director of the British subsidiary of Stone & Webster Engineering Corp.

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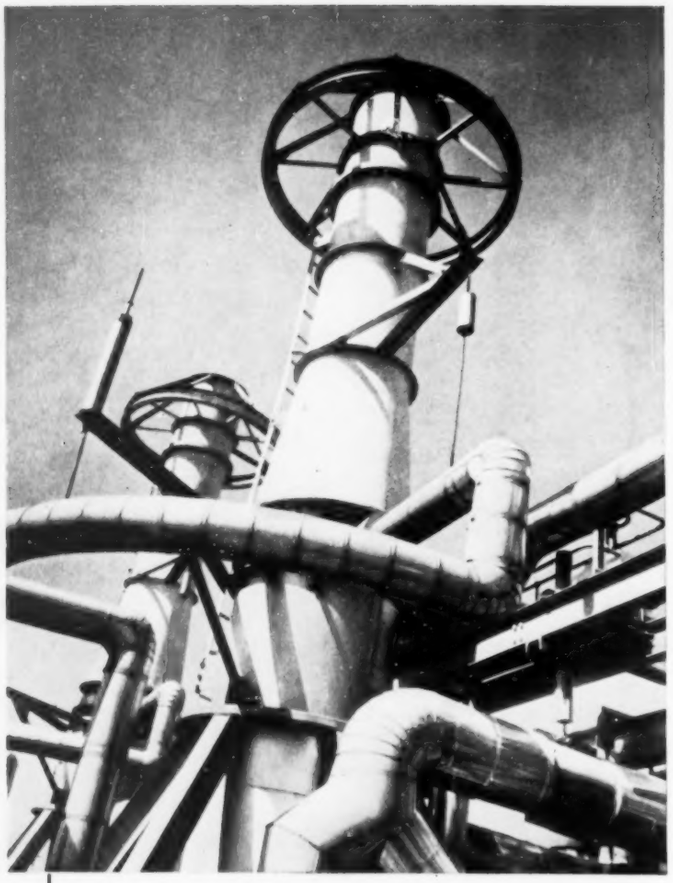

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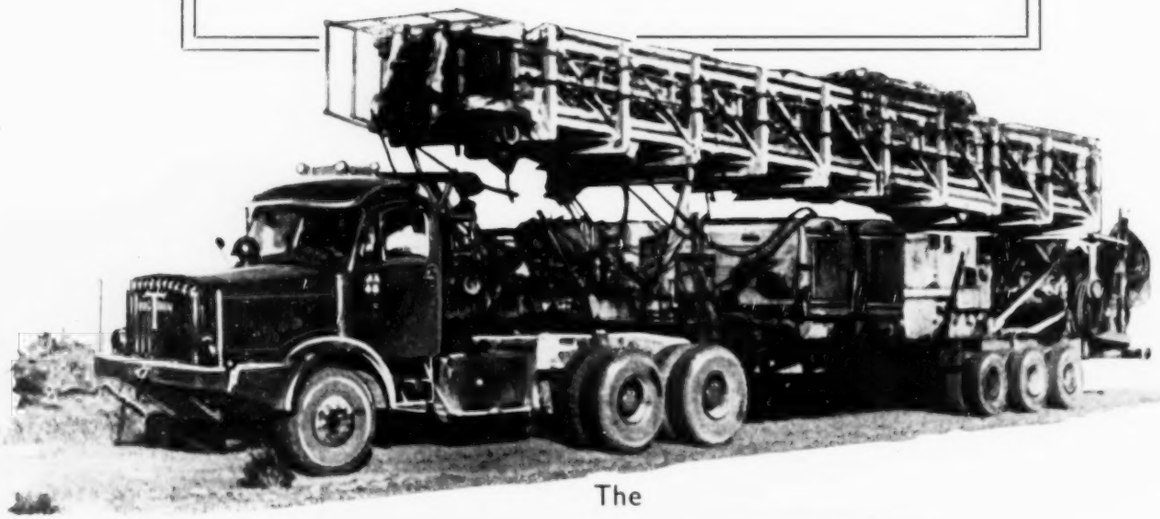

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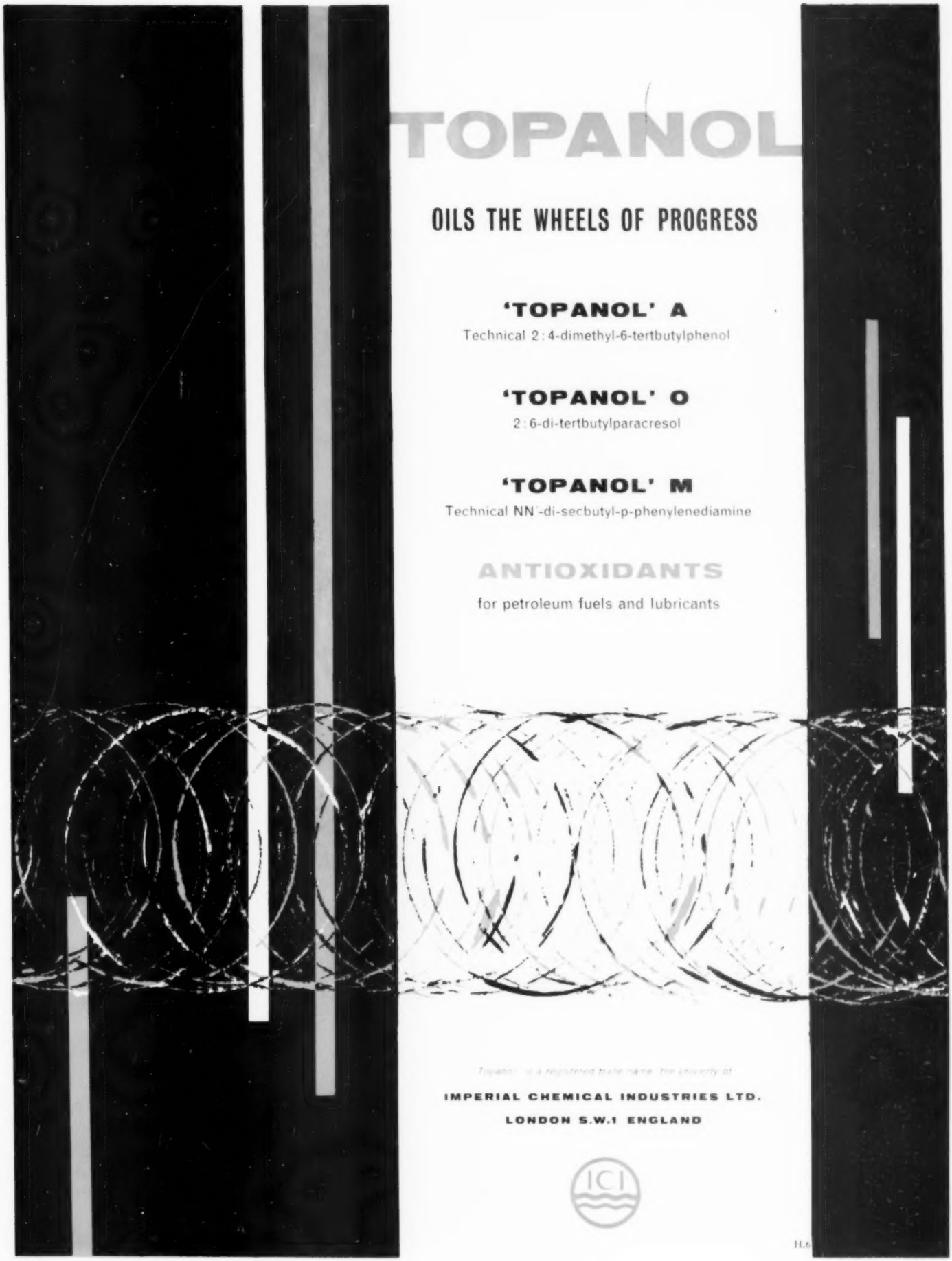

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